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Overview

Administering Splunk Enterprise Security

Splunk Enterprise Security administrators are responsible for configuring, maintaining, auditing, and customizing an instance of Splunk Enterprise Security. If you are not administering Splunk Enterprise Security, see *Use Splunk Enterprise Security* for an introduction to using this app as a security analyst.

Use the links below to learn more about administrative tasks in Splunk Enterprise Security.

**Manage and support analyst workflows**

To enable and customize the workflows for analysts in your organization, see:

- Managing Incident Review in Splunk Enterprise Security
- Customize Incident Review in Splunk Enterprise Security
- Customize notable event settings in Splunk Enterprise Security
- Manage investigations in Splunk Enterprise Security

**Enrich data for Enterprise Security**

Enrich Splunk Enterprise Security with data about the assets and identities in your environment and with additional data about known threats.

- See *Add asset and identity data to Splunk Enterprise Security* for a full list of tasks related to adding and managing asset and identity data in Splunk Enterprise Security.
- See *Add threat intelligence to Splunk Enterprise Security* for information on all tasks related to managing threat intelligence sources in Splunk Enterprise Security.

**Manage and customize configurations**

To perform ongoing configuration in Splunk Enterprise Security, see:

- Configure general settings for Splunk Enterprise Security
- Manage input credentials in Splunk Enterprise Security
- Manage permissions in Splunk Enterprise Security
Customize the menu bar in Splunk Enterprise Security
Configure advanced filtering in Splunk Enterprise Security

You can find additional configuration information in the Install and Upgrade Manual.

Configure and deploy indexes
Configure users and roles
Configure data models for Splunk Enterprise Security

Create, manage, and export content

To create new content or manage and customize existing content, see:

Create correlation searches in Splunk Enterprise Security
Create and manage key indicator searches in Splunk Enterprise Security
Create and manage saved searches in Splunk Enterprise Security
Create and manage search-driven lookups in Splunk Enterprise Security
Create and manage swim lane searches in Splunk Enterprise Security
Create and manage views in Splunk Enterprise Security
Create and manage lookups in Splunk Enterprise Security
Create risk and edit risk objects in Splunk Enterprise Security

To share custom content with other ES instances, see Export content from Splunk Enterprise Security as an app.

Troubleshoot dashboards

For tips and best practices useful for troubleshooting dashboards in Enterprise Security, see Troubleshoot dashboards in Splunk Enterprise Security.
For information about data model datasets that populate Enterprise Security dashboards, see Dashboard requirements matrix for Splunk Enterprise Security.
For an overview of all dashboards in Splunk Enterprise Security, see Introduction to the dashboards available in Splunk Enterprise Security in Use Splunk Enterprise Security.
Incident Review and Investigations

Managing Incident Review in Splunk Enterprise Security

Splunk Enterprise Security detects patterns in your data and automatically reviews events for security-relevant incidents using correlation searches. When a correlation search detects a suspicious pattern, the correlation search creates an alert called a notable event.

The Incident Review dashboard surfaces all notable events, and categorizes them by potential severity so analysts can quickly triage, assign, and track issues.

- For information about how analysts use the Incident Review dashboard, see Incident Review overview in Use Splunk Enterprise Security.
- To audit and review analyst activity on the Incident Review dashboard, see Incident Review Audit in Use Splunk Enterprise Security.
- To customize the display of the Incident Review dashboard, and also modify analyst capabilities and permissions, see Customize Incident Review in Splunk Enterprise Security.
- To manually create notable events, see Manually create a notable event in Splunk Enterprise Security.
- To customize settings for notable events, see Customize notable event settings in Splunk Enterprise Security.
- For more information about how notable events are populated and managed by the notable event framework, see Notable Event framework in Splunk Enterprise Security on the Splunk developer portal.

How risk scores display in Incident Review

Risk scores do not display in Incident Review for every asset or identity. Only assets or identities (risk objects) that have a risk score and a risk object type of "system" or "user" display in Incident Review. Risk scores only show for the following fields: orig_host, dvc, src, dest, src_user, and user. The risk score for an asset or identity might not match the score on the Risk Analysis dashboard. The risk score is a cumulative score for an asset or identity, rather than a score specific to an exact username.
• For example, if a person has a username of "buttercup" that has a risk score of 40, and an email address of "buttercup@splunk.com" with a risk score of 60, and the identity lookup identifies that "buttercup" and "buttercup@splunk.com" belong to the same person, a risk score of 100 displays on Incident Review for both "buttercup" and "buttercup@splunk.com" accounts.

• As another example, if an IP of 10.11.36.1 has a risk score of 80 and an IP of 10.11.36.19 has a risk score of 30, and the asset lookup identifies that a range of IPs "10.11.36.1 - 10.11.36.19" belong to the same asset, a risk score of 110 displays on Incident Review for both "10.11.36.1" and "10.11.36.19" IP addresses.

Risk scores are calculated for Incident Review using the Threat - Risk Correlation - Lookup Gen lookup generation search. The search runs every 30 minutes and updates the risk_correlation_lookup lookup file. To see more frequent updates to the risk scores in Incident Review, update the cron_schedule of the saved search.

**Notify an analyst of untriaged notable events**

You can use a correlation search to notify an analyst if a notable event has not been triaged.

1. Select Configure > Content > Content Management.
2. Locate the Untriaged Notable Events correlation search using the filters.
3. Modify the search, changing the notable event owner or status fields as desired.
4. Set the desired alert action.
5. Save the changes.
6. Enable the Untriaged Notable Events correlation search.

**Customize Incident Review in Splunk Enterprise Security**

As a Splunk Enterprise Security administrator, you can customize the way that analysts view and interact with notable events on the Incident Review dashboard.

**Modify analyst capabilities and permissions**

Configure whether analysts can override the calculated urgency of a notable event and choose whether to require an analyst to add a comment when
updating a notable event on the **Incident Review Settings** page.

1. Select **Configure > Incident Management > Incident Review Settings** to view the Incident Review settings.
2. Allow or prevent analysts from overriding the calculated urgency of a notable event with the **Allow Overriding of Urgency** checkbox. Analysts are allowed to override urgency by default.
3. Require analysts to add a comment when updating a notable event by checking the **Required** checkbox under **Comments**.
4. If you require analysts to add a comment, enter the minimum character length for required comments. The default character length is 20 characters.

**Configure the recommended capacity for analysts**

Configure the recommended maximum number of notable events that should be assigned per security analyst on the **General Settings** page.

1. Select **Configure > General > General Settings** to view the General Settings.
2. Enter a preferred number of notable events that should be assigned to an analyst with the **Incident Review Analyst Capacity** setting. The default is 12.

This value is used for audit purposes, and does not prevent more than the default number of notable events from being assigned to an analyst.

**Change Incident Review columns**

You can change the columns displayed on the Incident Review dashboard.

1. Review the existing columns in **Incident Review - Table Attributes**.
2. Use the action column to edit, remove, or change the order of the available columns.
3. Add custom columns by selecting **Insert below** or selecting **More...**, then **Insert above**.

**Troubleshoot an issue where analysts cannot edit notable events successfully on Incident Review**

If analysts cannot edit notable events successfully on Incident Review, several issues could be the cause.
• The analyst might not have permission to make status transitions. See Manage notable event statuses.
• The analyst might be attempting to edit a notable event that is visible, but cannot be edited successfully due to the limited number of events that can be retrieved from a bucket.

If a correlation search creates a high number of notable events in a short period of time, such as 1000 in less than five minutes, the Incident Review dashboard can hit the `max_events_per_bucket` limit when attempting to retrieve notable events for display from the `notable` index.

If analysts are unable to edit a notable event for this reason, the analyst can use a smaller time range when reviewing notable events on Incident Review. For example, a time range that reduces the number of events on the Incident Review dashboard to less than 1000. 1000 is the default value of `max_events_per_bucket`, so search that produces less than 1000 events cannot produce this error.

To prevent this from happening at any time, you can modify the maximum number of events that can be returned from a bucket. However, modifying this setting can negatively affect the performance of your Splunk software deployment.

If you are running Splunk Enterprise Security on Splunk Cloud, file a support ticket for assistance with this setting.

2. Set `max_events_per_bucket` to a number above 1000.
3. Save.

See `limits.conf` for more about the `max_events_per_bucket` setting.

**Add a navigation link to a filtered view of Incident Review**

To help ES analysts with their workflows, you can add a link in the app navigation that loads a version of Incident Review with filters applied. See Add a link to a filtered view of Incident Review.
Manually create a notable event in Splunk Enterprise Security

You can manually create a notable event from an indexed event, or create one from scratch.

**Note**: By default, only administrators with the edit_reviewstatuses capability can manually create notable events. To grant other users this capability, see Configure users and roles in the *Installation and Upgrade Manual*.

Create a notable event from an existing event

You can create a notable event from any indexed event using the **Event Actions** menu. Do not create a notable event from notable events on the Incident Review dashboard.

1. From an event, view the event details and click **Event Actions**.
2. Select **Create notable event**.
3. Enter a **Title** for the event.
4. (Optional) Select a security **Domain**.
5. (Optional) Select an **Urgency** level.
6. (Optional) Select an **Owner**.
7. (Optional) Select a **Status**.
8. Enter a **Description** for the event that describes why you created the notable event or what needs to be investigated.
9. Save the new notable event. The **Incident Review** dashboard displays with your new notable event.

**Note**: A notable event created in this way includes tracking fields such as **Owner** and **Status**, but does not include the unique fields or links created when a notable event is generated by a correlation search alert action.

Create a notable event from scratch

Create a notable event based on observations, a finding from a security system outside Splunk, or something else.

1. Select **Configure > Incident Management > New Notable Event**.
2. Enter a **Title** for the event.
3. (Optional) Select a security **Domain**.
4. (Optional) Select an **Urgency** level.
5. (Optional) Select an **Owner**.
6. (Optional) Select a **Status**.
7. Enter a **Description** for the event that describes why you created the notable event or what needs to be investigated.
8. Save the new notable event. The **Incident Review** dashboard displays with your new notable event.

**Use the owner field in a Splunk event to create a notable event with said owner**

Normally in a correlation search, the **owner** field automatically maps to **orig_owner**. If you have some Splunk events, doesn't matter where they came from, and you want the owner field of the Splunk event to be the owner of the notable event, it is crucial that the value of the **owner** field is a Splunk username.
To use the owner field in a Splunk event to create a notable event with said owner, remove the **owner** field from the list of notable mapfields.

Your correlation rule will look similar to the following in $SPLUNK_HOME/etc/apps/SplunkEnterpriseSecuritySuite/local/savedsearches.conf:

```plaintext
## savedsearches.conf
[Threat ? My Correlation ? Rule]
? action.notable.param.mapfields =
  rule_id,rule_name,rule_title,rule_description,security_domain,nes_fields,drilldown_name,drilldown_search,governance,contro ...
?
```

For example, if you have a CSV lookup that contains the "owner" field for assigning the new owners, then you can dynamically update the owner of an event in incident review by updating the lookup using a search similar to this one:

```
| inputlookup es_notable_events | search owner=gleb | eval owner="george"| outputlookup es_notable_events append=true key_field=owner
```

**Pinpoint the original event via drill-down**

If you are creating a notable event from a raw event, you can pinpoint the specific raw event that contributed to the notable event.

When certain fields exist such as **orig_event_hash**, a secondary drill-down link is automatically constructed for you called "View original event." If the correct fields are passed with the notable event you can construct a very performant search for getting back to the original event.
The following fields come into play:

- `orig_time` (optional)
- `orig_index` (optional)
- `orig_indexer_guid` (optional)
- `orig_event_hash` (required)

The `orig_time` and `orig_index` are automatically created if you pass `_time` and `index` respectively. This is because `_time` and `index` are included in the default set of `mapfields`. For `indexer_guid` and `event_hash` you will either need to manually rename to `orig_<field>` or add them to `mapfields` as appropriate.

Your correlation rule will look similar to the following in

```
$SPLUNK_HOME/etc/apps/SplunkEnterpriseSecuritySuite/local/savedsearches.conf:
```

```
## savedsearches.conf
[Threat ? My Correlation ? Rule]

action.notable.param.mapfields =
    rule_id,rule_name,rule_title,rule_description,security_domain,nes_fields,drilldown_name,drilldown_search,governance,contro...

# Customize notable event settings in Splunk Enterprise Security

As a Splunk Enterprise Security administrator, you can make configuration changes to notable events.

- Change notable event fields.
- Manage notable event statuses.
- Create and manage notable event suppressions.

Change notable event fields

Make changes to the fields displayed on the Incident Review dashboard for notable events on the Incident Review Settings dashboard. For example, change the label of a field in the notable event details, remove a field, or add a field to the Additional Fields section of the notable event details. Changes that you make to notable event fields affect all notable events.

1. From the Splunk Enterprise Security menu bar, select **Configure > Incident Management > Incident Review Settings**.
2. Review the **Incident Review - Event Attributes**.
3. Click **Edit** to change a field or the label for a specific field that appears on Incident Review.

4. Click **Remove** to remove a field from the notable event details on the Incident Review dashboard.

5. Click **Save** to save your changes.

**Add a field to the notable event details**

A field appears in the **Additional fields** of the notable event details if the field exists in the correlation search results and Incident Review can display the field. To add a field to the notable event details, first make sure that the correlation search results include the field and then make sure that Incident Review can display the field.

1. Determine if the field you want to see is included in the correlation search results. Run the correlation search on the Search page to review the output or the search syntax.
   ♦ If the field exists in the search results, go to step four.
   ♦ If the field does not exist in the search results, go to step two.

2. Modify the correlation search to include the field.
   ♦ If you can edit the search with the guided search editor, add the field as an aggregate function with an alias. Use the `values` function to return all possible values of a given field, or the `latest` function to return the most recent value for the field.
   ♦ If you created the search manually, modify the search to extract the fields. Make sure that you do not modify the correlation criteria when you modify the search.
     ◊ If the search does not include statistical transformations, add `| fields + newfieldname` to the end of the search, where `newfieldname` is the name of the new field you want to see in the additional details.
     ◊ If the search does include statistical transformations, extract the fields when you perform the statistical transformation.

3. Verify changes to correlation searches on the Search page before saving them.

4. Add the field to the list of additional fields.
   1. From the Splunk Enterprise Security menu bar, select **Configure > Incident Management > Incident Review Settings**.
   2. Click **Add new entry** to add the new field to the **Additional Fields** section of the notable event details.
   3. Type a **Label** to use as the display name of the field in the notable event details.
4. Type a **Field** to match the field that you want to appear in the notable event details.
5. Click **Done**.
6. Click **Save**.

**SPL search to verify the additional fields**

Use the following search to get a list of all of the active **Additional Fields**.

```
| rest splunk_server=local  
/servicesNS/-/-/configs/conf-log_review/incident_review | fields event_attributes | eval d=split(event_attributes, ",") | rex field=d max_match=0 "field:\s*:\s*"(?<field>[^\"]+)" | rex field=d max_match=0 "label:\s*:\s*"(?<label>[^\"]+)" | eval mv=mvzip(field,label) | fields mv | mexpand mv | eval field=mvindex(split(mv,""), 0), label=mvindex(split(mv,""), 1) | table field, label
```

A truncated example response follows.

<table>
<thead>
<tr>
<th><strong>field</strong></th>
<th><strong>label</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>action</td>
<td>Action</td>
</tr>
<tr>
<td>app</td>
<td>Application</td>
</tr>
<tr>
<td>bytes_in</td>
<td>Bytes In</td>
</tr>
<tr>
<td>bytes_out</td>
<td>Bytes Out</td>
</tr>
<tr>
<td>category</td>
<td>Category</td>
</tr>
<tr>
<td>change_type</td>
<td>Change Type</td>
</tr>
<tr>
<td>channel</td>
<td>Channel</td>
</tr>
<tr>
<td>command</td>
<td>Command</td>
</tr>
<tr>
<td>cpu_load_percent</td>
<td>CPU Load (%)</td>
</tr>
<tr>
<td>creator</td>
<td>Creator</td>
</tr>
<tr>
<td>creator_realname</td>
<td>Creator Realname</td>
</tr>
<tr>
<td>cve</td>
<td>CVE</td>
</tr>
<tr>
<td>decoration</td>
<td>Decoration</td>
</tr>
<tr>
<td>desc</td>
<td>Description</td>
</tr>
<tr>
<td>dest</td>
<td>Destination</td>
</tr>
<tr>
<td>dest_threatlist_category</td>
<td>Destination Threat List Category</td>
</tr>
</tbody>
</table>
### Manage notable event statuses

An analyst assigns a status to a notable event in the investigation workflow. The status aligns with the stages of an investigation, and can be used to review and report on the progress of a notable event investigation on the Incident Review Audit dashboard.

To see the available statuses for notable events, select **Configure > Incident Management > Status Configuration**.

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
<th>Can be edited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unassigned</td>
<td>Used by Enterprise Security when an error prevents the notable event from having a valid status assignment.</td>
<td>No</td>
</tr>
<tr>
<td>New (default)</td>
<td>The notable event has not been reviewed.</td>
<td>No</td>
</tr>
<tr>
<td>In Progress</td>
<td>An investigation or response to the notable event is in progress.</td>
<td>Yes</td>
</tr>
<tr>
<td>Pending</td>
<td>Closure of the notable event is pending some action.</td>
<td>Yes</td>
</tr>
<tr>
<td>Resolved</td>
<td>The notable event has been resolved and awaits verification.</td>
<td>Yes</td>
</tr>
<tr>
<td>Closed</td>
<td>The notable event has been resolved and verified.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Every notable event is assigned a status of **New** by default when it is created by a correlation search. You can customize notable event statuses to match an existing workflow at your organization.

### Edit notable event statuses

Change the available statuses for notable events on the **Edit Notable Event Status** page.
2. Select a notable event status to open the Edit Notable Event Status page.
3. (Optional) Change the Label or Description.

You cannot edit the Unassigned and New statuses because they are defaults used when creating notable events.

**Manage notable event status history**

Notable events are associated with users, statuses, and comments. Changes made to status names only affect the name of a status, not the status ID assigned to the notable event in the notable index.

If you change the name of a default notable event status, the name changes for both past and future notable events. For example, if you rename "pending" to "waiting for customer", all notable events with a status of "pending" will then have a status of "waiting for customer". The status ID assigned to the notable events remains the same.

**Notable event status transitions**

Statuses represent the steps in investigating a notable event. Status transitions define the path of a notable event investigation.

An analyst changes the status of the notable event as the investigation progresses. To change the status of a notable event:

- The analyst must be a member of a role that has permission to change a status. The ability to change notable event statuses is available to the ess_analyst and ess_admin roles by default.
- The follow-on status must allow a transition from the current status. By default, every status can transition to any other status. For example, an analyst can change the status of a notable event with the New status to any other status, such as Closed.

**Restrict notable event status transitions**

You can define a status workflow and limit which statuses analysts can transition to other statuses, creating a path for a notable event investigation. By default, a notable event in any status can be changed to any other status.
Prerequisites

- You must have the **ess_admin** role or your role must be assigned the **Edit Statuses** capability. For more information about user roles and capabilities, see Configure users and roles in the *Installation and Upgrade Manual*.
- Define a status workflow for notable event investigations. Determine which statuses to require, and whether analysts must follow a specific sequence of statuses before completing the workflow. Determine whether any roles can bypass the full workflow.

Steps

1. On the Splunk Enterprise Security toolbar, select **Configure > Incident Management > Status Configuration**.
2. Select a notable event status to open the Edit Notable Event Status page.
3. In Status Transitions, modify the **To Status** fields. These fields control which statuses analysts can transition a notable event to if it is in the status that you are editing.
   - 1. To define which roles are allowed to transition a notable event to the selected status, choose the **Authorization** field and add or remove roles.
   - 2. To remove a transition for an event to the selected status, choose **Unselect All**.
4. Click **Save**.

Example of restricting notable event status transitions

This example walks you through setting up restricting status transitions for analysts. Restrict status transitions so that analysts must follow a path from New, to In Progress or Pending, to Resolved, then to Closed.

1. On the Splunk Enterprise Security toolbar, select **Configure > Incident Management > Status Configuration**.
2. Restrict the transitions from the **New** status. Select the **New** status to open the Edit Investigation Status page.
3. In **Status Transitions**, select the roles for the **Resolved** status and deselect the check box for the **ess_analyst** role.
4. Select the roles for the **Closed** status and deselect the check box for the **ess_analyst** role.
5. Click **Save** to save the changes to the **New** status.
6. Restrict the transitions on the **In Progress** and **Pending** statuses to prevent the **ess_analyst** role from transitioning to **New** or to **Closed**.
7. Select the **In Progress** status.
8. In **Status Transition**, select the roles for the **New** status and deselect the check box for the ess_analyst role. Repeat for the **Closed** status.
9. Click **Save** to save the changes to the **In Progress** status.
10. Repeat steps 8 and 9 for the **Pending** status.
11. Restrict the **Resolved** status. Click the **Investigation** tab and select the **Resolved** status.
12. In **Status Transition**, select the roles for the **New** status and deselect the check box for the ess_analyst role. Repeat for the **In Progress** and **Pending** statuses.
13. Click **Save** to save the changes to the **Resolved** status.
14. Restrict the transitions for the **Closed** status. Select the **Closed** status.
15. In **Status Transition**, select the roles for the **New** status and deselect the check box for the ess_analyst role. Repeat for the **In Progress**, **Pending**, and **Resolved** statuses.
16. Click **Save** to save the changes for the **Closed** status.

**Create a status**

Create a status for the notable event investigation workflow.

**Prerequisites**

If you restrict status transitions, determine where the new status is needed in the workflow and whether any roles can bypass the new status in the workflow.

**Steps**

1. On the Splunk Enterprise Security toolbar, select **Configure > Incident Management > Status Configuration**.
2. Select **Create New Status > Notable**.
3. Type a **Label** that represents the status on the Incident Review dashboard.
   For example, Waiting on ITOps.
4. (Optional) Type a description that appears on the Status Configuration page.
   For example, Waiting on the IT operations department.
5. (Optional) Select the check box for **Default Status**. Select this check box if you want to replace the **New** status as the default status for newly-created notable events.
6. (Optional) Select the check box for **End Status**. Select this check box if you are adding an additional **Closed** status for notable events, such as False Positive.
7. (Optional) Deselect the check box for **Enabled**. Deselect this check box if you want to create this status without using it.
8. Update the status transitions by modifying the **To Status** fields. If you do not select any roles that can transition from this status to another one, no one will be able to move the notable event to a different status after transitioning the notable event to this status. If you do not restrict status transitions, select all roles for each status.
9. Click **Save**.

If you restrict status transitions based on user roles, modify the status transitions for each status that can transition to this new status.

**Create and manage notable event suppressions**

You can hide notable events from the Incident Review dashboard by creating a notable event suppression.

A suppression is a search filter that hides additional notable events from view, and is used to stop excessive or unwanted numbers of notable events from appearing on the Incident Review dashboard. Notable events that meet the search conditions are still created and added to the notable index. Suppressed notable events continue to contribute to notable event counts on the Security Posture and auditing dashboards.

To prevent notable events that meet certain conditions from being created, see **Throttle the number of response actions generated by a correlation search**.

You can create a suppression filter in two ways.

- Create a suppression from Incident Review. See **Suppress a notable event**.
- Create a suppression from the **Configure** menu. See **Create a suppression from Notable Event Suppressions**.

**Create a suppression from Notable Event Suppressions**

1. Select **Configure > Incident Management > Notable Event Suppressions**.
2. Click **Create New Suppression**.
3. Enter a **Name** and **Description** for the suppression filter.
4. Enter a **Search** to use to find notable events to be suppressed.
   The search goes directly into the eventtype stanza, so the use of pipes is limited. See eventtypes.conf in the Splunk Enterprise **Admin Manual**.
5. Set the **Expiration Time**. This defines a time limit for the suppression filter. The expiration time does not prevent the suppression from working, so events within the specified time range will continue to be suppressed until you disable the suppression. Notable events that fall outside the expiration time are not suppressed.

**Edit notable event suppressions**

1. Select **Configure > Incident Management > Notable Event Suppressions**.
2. Select a notable event suppression to open the **Edit Notable Event Suppression** page.
3. Edit the **Description** and **Search** fields used for the suppression filter.
4. Click **Save**.

**Disable notable event suppressions**

1. Select **Configure > Incident Management > Notable Event Suppressions**.
2. Select **Disable** in the **Status** column for the notable event suppression.

**Remove a notable event suppression**

1. From the Splunk platform toolbar, select **Settings > Event types**.
2. Search for the the suppression event:
   
   `notable_suppression-<suppression_name>`.
3. Select **delete** in the **Actions** column for the notable event suppression.

**Audit notable event suppressions**

Audit notable event suppressions with the **Suppression Audit** dashboard. See Suppression Audit in *Use Splunk Enterprise Security*.

**Expand tokens in notable events using the expandtoken command**

Tokens in notable event titles and descriptions automatically get expanded to include the values of the tokens on the Incident Review dashboard. With the `expandtoken` search command, you can expand the tokens in so that token replacement happens in your search results. The `expandtoken` search command is intended for use in Splunk Web.
Description

Expand the fields in notable events that contain tokens in the values, such as the title (rule_name) or description (rule_description) of a notable event. Tokens are automatically expanded on the Incident Review dashboard, but not within search.

Syntax

... | expandtoken [field],[field1],[field2]...

Optional argument

field

Description: The name of a field in the notable event that contains a token to expand. Do not specify the name of the token. Specify additional fields separated by commas. If you do not specify a field, all fields are processed for tokens to expand. For a list of example fields in notable events, see Using notable events in search in the Splunk developer portal.

Usage

The expandtoken command is a streaming command.

Limitations

The search command does not support token delimiters in the middle of a field name.

If you have tokens dependent on the expansion of other tokens, those tokens might not be reliably expanded because you cannot specify the order in which tokens are expanded. For example, if you have a rule_description: "Brute force access behavior detected from $src$." and a drilldown_name: "See contributing events for $rule_description$", the following search might expand the $src$ token without expanding the $rule_description$ token.

`notable` | expandtoken

For more information about tokens, see Token usage in dashboards in the Splunk Enterprise Dashboards and Visualizations Manual.
Examples

The following examples show usage of the `expandtoken` search command in Splunk Web.

**Expand tokens for all notable events**

`notable` | expandtoken  
rule_title,rule_description,drilldown_name,drilldown_search

**Expand tokens for a specific notable event**

Expand tokens for a specific notable event based on the event_id field.

`notable` | where event_id="<event_id>" | expandtoken  
rule_title,rule_description

Expand tokens for a specific notable event based on the short ID field.

`notable` | where notable_xref_id="<short ID>" | expandtoken  
rule_title,rule_description

**See also**

For a list of example fields in notable events, see Using notable events in search in the Splunk developer portal.

For more information about tokens, see Token usage in dashboards in the Splunk Enterprise *Dashboards and Visualizations Manual*.

**Manage investigations in Splunk Enterprise Security**

As an Enterprise Security administrator, you can manage access to security investigations, and support analysts by troubleshooting problems with their action history.

For more information about the analyst investigation workflow, see Investigations in Splunk Enterprise Security in *Use Splunk Enterprise Security*. 
**Manage access to investigations**

Users with the **ess_admin** role can create, view, and manage investigations by default. Users with the **ess_analyst** role can create and edit investigations. Make changes to capabilities with the Permissions dashboard.

- To allow other users to create or edit an investigation, add the **Manage Your Investigations** capability to their role. Users can only make changes on investigations on which they are a collaborator.
- To allow other users to manage, view, and delete all investigations, add the **Manage All Investigations** capability to their role.

See Configure users and roles in the *Installation and Upgrade Manual*.

You can manage who can make changes to an investigation by setting write permissions for collaborators on a specific investigation. By default, all collaborators have write permissions for the investigations to which they are added, but other collaborators on the timeline can change those permissions to read-only. See Make changes to the collaborators on an investigation in *Use Splunk Enterprise Security*.

After a user creates an investigation, any user with the **Manage All Investigations** capability can view the investigation, but only the collaborators on the investigation can edit the investigation. You cannot view the investigation KV Store collections as lookups. Only users with the admin role can view or modify the KV store collections using the KV Store API endpoint. For details about using the KV Store API endpoint, see KV Store endpoint descriptions in the Splunk Enterprise REST API Reference Manual.

**Data sources for investigations**

Splunk Enterprise Security stores investigation information in several KV Store collections. The investigations on the Investigations page, items added to the investigation, attachments added to notes on the investigation, and artifacts added to the investigation workbench each have their own collection. See **Investigations** in the Dashboard requirements matrix for Splunk Enterprise Security.

Investigation details from investigations created in versions earlier than 4.6.0 of Splunk Enterprise Security are stored in two KV Store collections, `investigative_canvas` and `investigative_canvas_entries`. Those collections are preserved in version 4.6.0 but the contents are added to the new investigation KV Store collections. So to restore, you may need to restore
investigation, investigation_attachment, investigation_event, investigation_lead, investigative_canvas, and investigative_canvas_leads.

Troubleshoot investigation action history items

When an analyst selects a type of action history to add to an investigation, one of five searches run over the selected time range.

- Dashboard Views - Action History
- Search Tracking - Action History
- Per-Panel Filtering - Action History
- Notable Suppression - Action History
- Notable Status - Action History

View the searches by navigating to Configure > Content > Content Management and using the filters on the page. If you change these saved searches, action history items might fail to appear in your action history. To exclude a search from your action history, use the Action History Search Tracking Whitelist lookup. See Create and manage lookups in Splunk Enterprise Security.

Administer and customize the investigation workbench

The workbench extends existing investigation functionality in Splunk Enterprise Security by allowing analysts to perform investigative actions in one location. Analysts investigate artifacts, or assets and identities, using panels, tabs, and profiles on the workbench. You can customize the workbench by creating panels, tabs, and profiles to help analysts. You can also set up artifact extraction from notable events to accelerate investigations that start from notable events.

The workbench introduces a configuration file, es_investigations.conf, that is used to manage the metadata for panels, tabs, and profiles. You can make changes in the file system by adding stanzas to the es_investigations.conf file. Refer to es_investigations.conf.spec and es_investigations.conf.example for details.

Create panels and tabs for the investigation workbench

The investigation workbench can display any prebuilt panel that has a workbench panel reference and has been added to a workbench tab.
1. Create or modify a prebuilt panel. See Create or modify a prebuilt panel for the investigation workbench in this topic.

2. Create a workbench panel that references the prebuilt panel. See Create a tab for the investigation workbench in this topic.

3. Create a workbench tab that includes the workbench panel. See Create a tab for the investigation workbench in this topic.

For an example of this entire process, see Example panel conversion and workbench panel creation in this topic.

Create or modify a prebuilt panel for the investigation workbench

You can use any prebuilt panel on the investigation workbench. You can create one specifically for the workbench, or you can modify an existing panel. You can create or modify a prebuilt panel with Splunk Enterprise Security in several ways:

- Create a panel from Content Management.
  1. From the ES menu bar, select Configure > Content > Content Management.
  2. Select Create New Content > Panel.
  3. Type a Prebuilt panel ID.
  4. Select a Destination App.
  5. Type Prebuilt panel XML.
  6. Click Save.

- Convert a dashboard panel to a prebuilt panel. See Convert an existing panel to a prebuilt panel in Dashboards and Visualizations.

- Modify a panel in Splunk Settings.
  1. From the Splunk menu bar, select Settings > User Interface.
  2. Click Prebuilt Panels and click Edit > Edit Panel for the panel that you want to modify.

If you modify an existing prebuilt panel, consider cloning it before you modify it. If you clone the panel, change the panel ID so that you remember which one is specific to the workbench.

- Create a panel in Splunk Settings. See Add panels to dashboards in Dashboards and Visualizations.

When creating or modifying a prebuilt panel for the workbench, follow these guidelines for the best user experience:

- Add one or more tokens to the panel search to limit your search results to the artifacts investigated on the workbench. Use multiple tokens to substitute more than one type of artifact. Define your token using the
syntax \$token\$. You set up the format of the token when you create the workbench panel.

- Remove the panel name from the panel XML. If you do not do this, two panel titles appear on the workbench. Workbench panels get the title from the Label field when you create a workbench panel.
- Add a drilldown to the panel so that analysts can add artifacts from the panel. Add a drilldown using the syntax `<option name="drilldown">cell</option>` in the panel XML. The workbench replaces existing panel drilldowns, such as custom searches, with this ability to add artifacts to the workbench scope from the panel.
- Update the permissions on the panel to be shared with Splunk Enterprise Security. Confirm that the panel is Shared in App or set to Display For: All Apps.
- If you save your panel in a dedicated app, make sure that the objects in the app are set to export globally. See Set permissions for objects in a Splunk app in the Splunk dev portal.
- To make your panel use a different time range than the one set by the workbench, set a time range in the panel search or panel XML.

Then, follow the steps to create a panel for the investigation workbench. See Create a panel for the investigation workbench in this topic.

**Create or modify a panel for the investigation workbench**

Create a workbench panel.

1. Select Configure > Content > Content Management.
2. Select Create New Content > Workbench Panel.
3. Select the prebuilt panel that you want to use on workbench from the drop-down list.
4. (Optional) Type a Label to replace the default panel title on the workbench.
5. (Optional) Type a Description to provide information about the panel.
6. Add a token to replace the token in the panel search. See Example panel conversion and workbench panel creation in this topic or see Define tokens for multiselect inputs in the Splunk Enterprise Dashboards and Visualizations Manual.
   1. Select the type of artifact from the Type drop-down menu: Identity, Asset, File, or URL.
   2. Click Apply.
7. Click Save.
8. Click Save.
Then add the panel to a tab so that it is visible on the workbench.

Modify a workbench panel.

1. Select **Configure > Content > Content Management**.
2. From the Type filter, select **Workbench Panel**.
3. Click the name of the panel.
4. Edit something, such as a token.

Tokens are now displayed in summary view instead of list view. The summary view displays each token name, type of artifact, and a preview of the token text that is generated out of the artifacts and put into place to run the search.
When you click the pencil to edit a token in the summary view, it will slide open into edit mode. In the preview section at the bottom of the edit window, you can see how the token value changes as you edit the token parameters. This helps to simulate what you will see in the search under certain situations.

Create a tab for the investigation workbench

Create a tab to display information specific to a particular data type, use case, or something else.

1. Select Configure > Content > Content Management.
2. Select Create New Content > Workbench Tab.
3. Type a Tab Name. This name becomes part of the stanza name in es_investigations.conf and is used as the label if you do not specify a label.
4. (Optional) Type a Label to provide a user-facing name for the workbench tab.
5. In Workbench Panels, select the panels that you want to appear on this tab. The order in which you select the panels is the order in which they appear on this tab on the workbench.
6. (Optional) Select a workbench profile to associate with this tab. You can only associate a tab with one profile. Profiles allow analysts to load multiple tabs that relate to a use case on the workbench.
7. (Optional) Change the Load by default selection. Select True if you want this tab to load for all workbench investigations.
8. (Optional) Type a Description for the tab. This helps analysts determine what types of information and context they can gather using the panels on the tab.
Example panel conversion and workbench panel creation

Prerequisite

You must have the Splunk Add-on for Blue Coat ProxySG installed, and data from the add-on in your Splunk Enterprise Security deployment. You can download the Splunk Add-on for Blue Coat ProxySG from Splunkbase.

1. Clone a panel and modify the search to use an input token with the workbench.
   1. Select Settings > User Interface.
   2. Click Prebuilt panels.
   3. Click Edit > Clone for the actions_by_destination_ip for the Splunk_TA_bluecoat-proxysg.
   4. Type a Prebuilt panel ID. workbench_actions_by_dest_ip.
   5. Remove the title from the XML, unless you want two titles to appear on the workbench.
   6. Modify the query in the XML to include a token that limits the results to the investigated asset artifacts.
      ```
      sourcetype="bluecoat:proxysg:access*" $dest_token$ | iplocation dest | geostats count by action
      ```
   7. Decide whether to remove the `<earliest>` and `<latest>` time range for the panel. This time range takes precedence over the time range set on the workbench, so you likely want to remove it so that analysts can perform context-sensitive searches.
   8. Click Save.

2. Modify the permissions of the panel.
   1. Locate the panel that you just created, workbench_actions_by_dest_ip.
   2. Select Edit > Edit Permissions.
   3. For Display for, select All apps.
   4. Click Save.

3. Return to Splunk Enterprise Security and set up the panel to be used on the workbench.
   1. Select Configure > Content > Content Management.
   2. Select Create New Content > Workbench Panel.
   3. Select a Panel Name of workbench_actions_by_dest_ip.
   4. (Optional) Type a user-facing Label that appears on the workbench: Proxy Actions by Destination.
   5. (Optional) Type a user-facing description that appears on the workbench: Displays a map that graphs the actions by
destination IP, when possible, specific to the investigated assets.

6. Click **Add a Token** to add a token for the $dest_token$ from the search.

7. Type a **Token Name** that corresponds to the token name. 
   `dest_token`

8. Type a **Prefix** of (.

9. Type a **Suffix** of ).

10. Type a **Value Prefix** of dest=".

11. Type a **Value Suffix** of ".

12. Unselect the check box for **Is Null** for the Delimiter and type *or* in the text box. Include the spaces on either side of the OR.

13. Leave the check box for **Is Null** for the Default field selected. If this check box is selected, the search runs only when an artifact of the relevant type is selected on the workbench. In this case, the search runs only if you are exploring assets on the workbench.

14. Select a **Type of Asset**, because the destination is an asset, not an identity or file or URL.

15. Click the **Available Artifacts** buttons to see what the token value will look like if there are 0, 1, or 2 artifacts. For an example of two assets:

   (dest="<Asset_Value_1>" OR dest="<Asset_Value_2>")

16. Click **Apply**.

17. Click **Save**.

   This panel now contains a search that would be constructed as follows for two assets investigated on the workbench:

   sourcetype="bluecoat:proxysg:access*"
   (dest="<investigated_asset_1>" OR dest="<investigated_asset_2>") | iplocation dest | geostats count by action

4. Add the new panel to a new tab.

1. On Content Management, select **Create New Content > Workbench Tab**.

2. Type a **Tab Name** of **proxy_data**. This name becomes the stanza name in es_investigations.conf and is used as the label if the label is not specified.

3. (Optional) Type a **Label** of **Proxy Data**.

4. In **Workbench Panels**, type and select the **Proxy Actions by Destination IP** panel.

5. For **Load by default**, leave it as **False**. Select True if you want this tab to load for all workbench investigations.

6. (Optional) Type a **Description** for the tab. **Proxy data related to investigated assets and identities.**
7. Click **Save**.

Analysts can then open a workbench and add the new tab to start investigating proxy data in the workbench.

**Create a workbench profile**

You can use profiles on the workbench to associate several tabs together that all fit a specific use case. For example, a DDoS Investigation profile might include a Firewall data tab and a general Network data tab. An analyst can then add the DDoS Investigation profile to an investigation to add both of those tabs to the workbench, rather than having to individually add tabs that fit the investigation.

1. Select **Configure > Content > Content Management**.
2. Select **Create New Content > Workbench Profile**.
3. Type a **Profile Name**. This name becomes the stanza name in `es_investigations.conf` and is used as the label if the label is not specified.
4. (Optional) Type a **Label** to provide a user-facing name for the workbench profile.
5. (Optional) Type a **Description** for the profile. This helps analysts determine what types of information and context they can gather by adding the profile to their investigation.
6. Click **Save**.

After creating a profile, update the tabs with the profile that you created. For the DDoS investigation example, edit the Firewall data and Network data tabs and select the new DDoS Investigation profile.

**Set up artifact extraction for notable events**

You can define the fields that are automatically extracted as identities or assets on the workbench when a notable event is added to an investigation. By default, the same fields that are used for asset and identity correlation are the fields extracted from the notable events created by included correlation searches. You must add fields to be extracted for any custom correlation searches.

When artifacts are extracted, duplicates are not created if they already exist in the investigation. You will see a notification that "the following artifacts already exist and have not been added." The existing artifact is not linked against the new notable event that would have caused the duplicate artifact to be created. This does not prevent you from manually adding a duplicate artifact.
<table>
<thead>
<tr>
<th>Type of investigation artifact</th>
<th>Fields extracted for investigation scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset</td>
<td>dest, src, dvc, orig_host</td>
</tr>
<tr>
<td>Identity</td>
<td>user, src_user</td>
</tr>
</tbody>
</table>

If your correlation search does not use data models, or the search results contain different fields that you want to extract, you can specify the fields to extract into the investigation scope.

1. Select Configure > Content > Content Management.
2. Click the correlation search that you want to customize to open it for editing.
3. Select the notable event adaptive response action.
4. For **Asset Extraction**, type a field name from the correlation search results that identifies an asset. Press Enter to add the field name.
5. For **Identity Extraction**, type a field name from the correlation search results that identifies an identity. Press Enter to add the field name.
6. Click Save.

**Manage and customize investigation statuses in Splunk Enterprise Security**

Starting in version 5.0.0, you can add statuses to investigations. After upgrading to this version, investigations that did not have a status are assigned the **New** status.

To change the status of an investigation, an analyst must have the `transition_reviewstatus-<x>_to_<y>` capability for the statuses that they want to transition between. The `ess_analyst` role and the `ess_admin` role have these capabilities for all statuses by default. Modifying status transitions for investigations modifies these capabilities.

To make changes to statuses as an analyst, you must have the `edit_reviewstatuses` capability. The `ess_admin` role has this capability by default. See Configure users and roles in the *Installation and Upgrade Manual*.

**Create an investigation status**

Create a status for analysts to select when performing an investigation.

If you restrict status transitions, update status transitions after creating a status, otherwise analysts will be unable to select the new status. See Restrict status
transitions for investigations in this topic.

1. From the Enterprise Security toolbar, select **Configure > Incident Management > Status Configuration**.
2. (Optional) Select the **Investigation** tab to review existing investigation statuses.
3. Select **Create New Status > Investigation**.
4. Type a **Label** that appears as the name of the status on the investigation. For example, Waiting on Desktop IT.
5. (Optional) Type a **Description** that appears on the **Status Configuration** page to describe the status. For example, Investigation is waiting for desktop IT to perform additional remediation or forensics steps.
6. (Optional) Select the check box for **Default Status** to set this status as the default for newly-created investigations.
7. (Optional) Select the check box for **End Status** to set this status as a possible last status for an investigation.
8. (Optional) Deselect the check box for **Enabled** to create the status without allowing anyone to use it yet.
9. Update the user roles that are able to transition an investigation from this new status, for example Waiting on Desktop IT, to another status, such as Closed. If you do not select any roles that can transition from this status to another one, no one will be able to move the investigation to a different status after transitioning the investigation to this status.
10. Click **Save**.

**Restrict status transitions for investigations**

The status transitions that can be made on an investigation define the path of an investigation. By default, an investigation in any status can be changed to any other status. For example, someone can change the status of an investigation in the **New** status to any other status, such as **Closed**.

You can restrict the statuses that analysts can choose when investigating. Determine which statuses to require, and whether analysts must follow a specific sequence of statuses before completing an investigation. Determine whether any roles can bypass the full sequence of statuses.

This example walks you through setting up restricting status transitions for analysts. Restrict status transitions so that analysts must follow a path from **New**, to **In Progress** or **Pending**, to **Resolved**, then to **Closed**.
### Prerequisites

- You must have the `ess_admin` role or your role must be assigned the `Edit Statuses` capability. For more information about user roles and capabilities, see Configure users and roles in the *Installation and Upgrade Manual*.

1. On the Splunk Enterprise Security toolbar, select **Configure > Incident Management > Status Configuration**.
2. Click the **Investigation** tab.
3. Restrict the transitions from the **New** status. Select the **New** status to open the Edit Investigation Status page.
4. In **Status Transitions**, select the roles for the **Resolved** status and deselect the check box for the `ess_analyst` role.
5. Select the roles for the **Closed** status and deselect the check box for the `ess_analyst` role.
6. Click **Save** to save the changes to the **New** status.
7. Restrict the transitions on the **In Progress** and **Pending** statuses to prevent the `ess_analyst` role from transitioning to **New** or to **Closed**.
8. Click the **Investigation** tab and select the **In Progress** status.
9. In **Status Transition**, select the roles for the **New** status and deselect the check box for the `ess_analyst` role. Repeat for the **Closed** status.
10. Click **Save** to save the changes to the **In Progress** status. Repeat those steps for the **Pending** status.
11. Restrict the **Resolved** status. Click the **Investigation** tab and select the **Resolved** status.
12. In **Status Transition**, select the roles for the **New** status and deselect the check box for the `ess_analyst` role. Repeat for the **In Progress** and **Pending** statuses.
13. Click **Save** to save the changes to the **Resolved** status.
14. Restrict the transitions for the **Closed** status. Click the **Investigations** tab and select the **Closed** status.
15. In **Status Transition**, select the roles for the **New** status and deselect the check box for the `ess_analyst` role. Repeat for the **In Progress**, **Pending**, and **Resolved** statuses.
16. Click **Save** to save the changes for the **Closed** status.
Correlation Searches

Correlation search overview for Splunk Enterprise Security

A correlation search scans multiple data sources for defined patterns. When the search finds a pattern, it performs an adaptive response action.

Correlation searches can search many types of data sources, including events from any security domain (access, identity, endpoint, network), asset lists, identity lists, threat intelligence, and other data in Splunk platform. The searches then aggregate the results of an initial search with functions in SPL, and take action in response to events that match the search conditions with an adaptive response action.

- To create a correlation search, see Create a correlation search in Splunk Enterprise Security Tutorials.
- To set up or modify correlation searches in your environment, see Configuring correlation searches.

Examples of correlation searches

- Identify an access attempt from an expired account by correlating a list of identities and an attempt to authenticate into a host or device.
- Identify a high number of hosts with a specific malware infection, or a single host with a high number of malware infections by correlating an asset list with events from an endpoint protection system.
- Identify a pattern of high numbers of authentication failures on a single host, followed by a successful authentication by correlating a list of identities and attempts to authenticate into a host or device. Then, apply a threshold in the search to count the number of authentication attempts.

Create correlation searches in Splunk Enterprise Security

You can create your own correlation searches to create notable events, modify risk scores, and perform other adaptive response actions automatically based on a correlation in events. There are two ways to create correlation searches in
Create a correlation search manually if you are an expert with SPL. You can review the included correlation searches for examples of the search methodology and available options. Test your correlation search ideas on the Search page before implementing them.

For more assistance with the syntax of correlation searches, use the guided search creation wizard to create a correlation search. The guided search creation wizard allows you to create a correlation search that uses data models or lookups as the data source. The wizard takes your choices about the data source, time range, filtering, aggregate functions, split-by fields, and other conditions and builds the syntax of the search for you. See Create a correlation search in Splunk Enterprise Security Tutorials for a step-by-step tutorial of creating a correlation search.

For details about how to make sure that additional fields appear in the notable event details for a custom correlation search, see Change notable event fields.

See also

- Configure correlation searches in Splunk Enterprise Security
- List correlation searches in Splunk Enterprise Security

Configure correlation searches in Splunk Enterprise Security

Configure correlation searches to enable or disable them, update the settings associated with how they run, change the search logic, and throttle their resulting adaptive response actions. See Correlation search overview for Splunk Enterprise Security to learn more about correlation searches.

Enable correlation searches

Enable correlation searches to start running adaptive response actions and receiving notable events. Splunk Enterprise Security installs with all correlation searches disabled so that you can choose the searches that are most relevant to your security use cases.

1. From the Splunk ES menu bar, select Configure > Content > Content Management.
2. Filter the **Content Management** page by a **Type** of **Correlation Search** to view only correlation searches.
3. Review the names and descriptions of the correlation searches to determine which ones to enable to support your security use cases. For example, if compromised accounts are a concern, consider enabling the **Concurrent Login Attempts Detected** and **Brute Force Access Behavior Detected** correlation searches.
4. In the **Actions** column, click **Enable** to enable the searches that you want to enable.

Only enable correlation searches that you use. For example, don't enable Untriaged Notable Events in an unattended production environment.

After you enable correlation searches, dashboards start to display notable events, risk scores, and other data.

**Change correlation search scheduling**

Change the default search type of a correlation search from real-time to scheduled. Splunk Enterprise Security uses indexed real-time searches by default.

1. From the **Content Management** page, locate the correlation search you want to change.
2. In the **Actions** column, click **Change to scheduled**.

After changing a search to be scheduled, you can modify the schedule settings of the search.

1. From the **Content Management** page, click the name of the correlation search you want to change.
2. (Optional) Modify the search schedule.
   Correlation searches can run with a real-time or continuous schedule. Use a real-time schedule to prioritize current data and performance. Searches with a real-time schedule are skipped if the search cannot be run at the scheduled time. Searches with a real-time schedule do not backfill gaps in data that occur if the search is skipped. Use a continuous schedule to prioritize data completion, as searches with a continuous schedule are never skipped.
3. (Optional) Modify the cron schedule to control how frequently the search runs.
4. (Optional) Specify a schedule window for the search. Type `0` to not use a schedule window, type `auto` to use the automatic schedule window set by
the scheduler, or type a number that corresponds with the number of minutes that you want the schedule window to last. When there are many scheduled reports set to run at the same time, specify a schedule window to allow the search scheduler to delay running this search in favor of higher-priority searches.

5. (Optional) Specify a schedule priority for the search. Change the default to Higher or Highest depending on how important it is that this search runs, and that it runs at a specific time.
   The schedule priority setting overrides the schedule window setting, so you do not need to set both.

If you manually convert a real-time search to a scheduled search, this does not automatically adjust the earliest or latest dispatch times. The time range default remains the same as the original real-time search, such as -5m@m ~ +5m@m which does discard events based on the extracted time being slightly in the future versus in the past. You will also need to evaluate the syntax of the converted search. This is because | datamodel is in use for real-time searches. However, if you are moving to a scheduled search, you can use | tstats for efficiency. If you use guided mode to convert the search, it can automatically switch the syntax from | datamodel to | tstats for you.

For information on search schedule priority, see the Splunk platform documentation.

- For tstats syntax, see Tstats in the Splunk Enterprise Search Reference.
- For Splunk Enterprise, see Prioritize concurrently scheduled reports in Splunk Web in the Splunk Enterprise Reporting Manual.
- For Splunk Cloud, see Prioritize concurrently scheduled reports in Splunk Web in the Splunk Cloud Reporting Manual.

### Edit a correlation search

You can make changes to correlation searches to fit your environment. For example, modify the thresholds used in the search, change the response actions that result from a successful correlation, or change how often the search runs. Modifying a correlation search does not affect existing notable events.

1. From the Content Management page, locate the correlation search you want to edit.
2. Click the name of a correlation search on the Content Management page to edit it.
3. Modify the parameters of the search, then click Save.
If you modify the start time and end time for the correlation search, use **relative time modifiers**. See Specify time modifiers in your search in the Splunk Enterprise *Search Manual*.

**Edit the correlation search in guided mode**

You can edit some correlation searches in guided mode. Not all correlation searches support guided search editing. If a search appears grayed-out and has the option to **Edit search in guided mode**, the search was built in guided mode and can be edited in guided mode. If a search can be edited in the search box, you cannot edit it in guided mode. Attempting to switch to guided mode overwrites your existing search with a new search.

1. Click **Edit search in guided mode** to open the guided search creation wizard.
2. Review the search elements in the correlation search, making changes if you want.
3. Save the search.

**Clone a correlation search**

You can clone correlation searches, but you must revise the `action.correlationsearch.label` setting to see the newly cloned search in Content Management.

1. Go to **Settings > Searches, reports, and alerts**.
2. Use the filter box to search for the correlation search that you would like to clone.
   1. If you don’t see any results, change the filters to **Type: All** and **App: All**.
3. In the Actions column of the correlation search, from the Edit drop-down, select **Clone**.
4. Click **Clone Alert**.
5. Close the "Alert has been cloned" window by clicking the x.
6. For the cloned correlation search, in the Actions column, from the Edit drop-down, select **Advanced Edit**.
7. Change the `action.correlationsearch.label` of the cloned search to a unique and meaningful name that you will see in Content Management.
8. Click **Save**.
9. Your new correlation search with the unique name now appears in **Content > Content Management** within a few minutes.
Throttle the number of response actions generated by a correlation search

Set up throttling to limit the number of response actions generated by a correlation search. When a correlation search matches an event, it triggers a response action.

By default, every result returned by the correlation search generates a response action. Typically, you may only want one alert of a certain type. You can use throttling to prevent a correlation search from creating more than one alert within a set period. To change the types of results that generate a response action, define trigger conditions. Some response actions allow you to specify a maximum number of results in addition to throttling. See Set up adaptive response actions in Splunk Enterprise Security.

1. Select Configure > Content > Content Management.
2. Click the title of the correlation search you want to edit.
3. Type a Window duration. During this window, any additional event that matches any of the Fields to group by will not create a new alert. After the window ends, the next matching event will create a new alert and apply the throttle conditions again.
4. Type the Fields to group by to specify which fields to use when matching similar events. If a field listed here matches a generated alert, the correlation search will not create a new alert. You can define multiple fields. Available fields depend on the search fields that the correlation search returns.
5. Save the correlation search.

Throttling applies to any type of correlation search response action and occurs before notable event suppression. See Create and manage notable event suppressions for more on notable event suppression.

If you have throttling set for an existing adaptive response action, such as a notable event alarm, editing the details of the alarm causes the throttling to be disregarded. The change to the alarm causes the throttle file, which notes how long to ignore events, to get removed. Therefore the throttling does not occur again until the next event is triggered.

Define trigger conditions for adaptive response actions generated by a correlation search
You can modify the conditions that control when an adaptive response action is generated by a correlation search. Throttling is different from defining trigger conditions and happens after search results meet the trigger conditions. When you define trigger conditions, the correlation search results are evaluated to check if they match the conditions. If the search results match the conditions, throttling rules control whether an adaptive response action is generated.

You can set up trigger conditions to generate response actions per-result, based on the number of results returned by the correlation search, based on the number of hosts, number of sources, or based on custom criteria. For custom criteria, type a custom search string to create a condition. Trigger conditions act as a secondary search against the results of the correlation search.

For information on trigger conditions and configuring those conditions for a search, see the Splunk platform documentation.

- For Splunk Enterprise, see Configure alert trigger conditions in the Splunk Enterprise Alerting Manual.
- For Splunk Cloud, see Configure alert trigger conditions in the Splunk Cloud Alerting Manual.

See also
- List correlation searches in Splunk Enterprise Security
- Set up adaptive response actions in Splunk Enterprise Security

List correlation searches in Splunk Enterprise Security

To obtain a list of correlation searches enabled in Splunk Enterprise Security, use a REST search to extract the information that you want in a table.

For example, create a table with the app, security domain, name, and description of all correlation searches in your environment.

```
| rest splunk_server=local count=0 /services/saved/searches | where match('action.correlationsearch.enabled', "1\|[Tt]\|[Tt]\|[Rr]\|[Uu]\|[Ee]\") | rename eai:acl.app as app, title as csearch_name,
action.correlationsearch.label as csearch_label,
action.notable.param.security_domain as security_domain | table csearch_name, csearch_label, app, security_domain, description
```
As another example, create a table with only the enabled correlation searches and the adaptive response actions associated with those searches in your environment. To see the adaptive response actions for all correlation searches, remove `where disabled=0`.

```
| rest splunk_server=local count=0 /servicesNS/-/SplunkEnterpriseSecuritySuite/saved/searches | where match('action.correlationsearch.enabled', "1\|\[Tt]\|\[Tt]\[Rr]\[Uu]\[Ee]\") | where disabled=0 | eval actions=split(actions, ",\") | table title,actions
```

### Upgrade correlation searches in Splunk Enterprise Security

Starting in Splunk Enterprise Security version 4.6.0, `correlationsearches.conf` is no longer used to define correlation searches. Instead, `savedsearches.conf` uniquely identifies correlation searches using the `action.correlationsearch.enabled=1` parameter. The `correlationsearches.conf` file is deprecated.

#### Changes Splunk Enterprise Security makes at upgrade

When you upgrade to Splunk Enterprise Security 4.6.0, Splunk Enterprise Security migrates all correlation searches in your environment from `correlationsearches.conf` to `savedsearches.conf` using the `confcheck_es_correlationmigration.py` script. The migration can take up to five minutes to complete after the upgrade. In a search head cluster, the captain performs the migration.

During the upgrade, Splunk Enterprise Security continues to create notable events without interruption. This change does not prevent or delay notable events from appearing on Incident Review because the Threat - Correlation Searches - Lookup Gen saved search continues to use the contents of both `correlationsearches.conf` and `savedsearches.conf` to populate the `correlationsearches KV Store collection used by Incident Review`.

#### Changes you have to make after upgrade

After upgrading to Splunk Enterprise Security 4.6.0 or later, you have to make additional changes.
• Check `correlationsearches.conf` for search definitions that would indicate that a search did not migrate successfully. Migrated searches only exist in `savedsearches.conf`. If a search did not get migrated, migrate the `correlationsearches.conf` entries manually to `savedsearches.conf` using the parameter definitions below.

• Update searches that call the `correlationsearches REST endpoint`.
  
  For example, a search that displays a list of correlation searches in your environment would change from
  
  ```bash
  | rest splunk_server=local /services/alerts/correlationsearches | rename eai:acl.app as app, title as csearch_name | table app security_domain csearch_name description
  ```
  
  to
  
  ```bash
  | rest splunk_server=local count=0 /services/saved/searches | where match('action.correlationsearch.enabled', "1|[Tt]|([Tt][Rr][Uu][Ee])") | rename eai:acl.app as app, title as csearch_name, action.correlationsearch.label as csearch_label, action.notable.param.security_domain as security_domain | table csearch_name, csearch_label, app, security_domain, description
  ```
  
  See List correlation searches in Splunk Enterprise Security for more examples of updated searches.

Custom search macros that reference the `correlationsearches KV Store` collection continue to work as before, but consider updating them anyway.

`correlationsearches.conf` parameter translation to `savedsearches.conf`

All `correlationsearches.conf` parameters now exist in `savedsearches.conf` and the `correlationsearches.conf` file has been deprecated. Do not update it directly except to manually migrate correlation search definitions.

Identification parameters for correlation searches

New parameters identify whether a saved search is a correlation search and the name of the correlation search.

<table>
<thead>
<tr>
<th><code>correlationsearches.conf</code> parameter in pre-4.6.0 versions</th>
<th><code>savedsearches.conf</code> parameter starting in 4.6.0</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>action.correlationsearch=0</td>
<td></td>
</tr>
</tbody>
</table>
This is an internal parameter and can be ignored.

<table>
<thead>
<tr>
<th>correlationsearches.conf parameter in pre-4.6.0 versions</th>
<th>savedsearches.conf parameter starting in 4.6.0</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A stanza for the search exists</td>
<td>action.correlationsearch.enabled=1</td>
<td>This parameter identifies a saved search as a correlation search.</td>
</tr>
<tr>
<td>rule_name</td>
<td>action.correlationsearch.label</td>
<td>This parameter provides the name of the correlation search.</td>
</tr>
<tr>
<td>description</td>
<td>description</td>
<td>This parameter provides the description of the correlation search.</td>
</tr>
</tbody>
</table>

### Notable event parameters for correlation searches

The `action.notable` parameter identifies a notable event associated with a correlation search. The parameters that describe additional details associated with the notable event now exist in the `savedsearches.conf` file.

<table>
<thead>
<tr>
<th>correlationsearches.conf parameter in pre-4.6.0 versions</th>
<th>savedsearches.conf parameter starting in 4.6.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>security_domain</td>
<td>action.notable.param.security_domain</td>
</tr>
</tbody>
</table>
### Related search parameters for correlation searches

Searches related to a correlation search, such as the context-generating searches associated with a correlation search that uses extreme search, are now part of a JSON blob `action.correlationsearch.related_searches` parameter.

<table>
<thead>
<tr>
<th>correlationsearches.conf parameter in pre-4.6.0 versions</th>
<th>savedsearches.conf parameter starting in 4.6.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>severity</td>
<td>action.notable.param.severity</td>
</tr>
<tr>
<td>rule_title</td>
<td>action.notable.param.rule_title</td>
</tr>
<tr>
<td>rule_description</td>
<td>action.notable.param.rule_description</td>
</tr>
<tr>
<td>nes_fields</td>
<td>action.notable.param.nes_fields</td>
</tr>
<tr>
<td>drilldown_name</td>
<td>action.notable.param.drilldown_name</td>
</tr>
<tr>
<td>drilldown_search</td>
<td>action.notable.param.drilldown_search</td>
</tr>
<tr>
<td>default_status</td>
<td>action.notable.param.default_status</td>
</tr>
<tr>
<td>default_owner</td>
<td>action.notable.param.default_owner</td>
</tr>
</tbody>
</table>

```bash
related_search_name = Endpoint - Emails By Source - Context Gen
related_search_name.0 = Endpoint - Emails By Destination Count - Context Gen
```

```bash
action.correlationsearch.related_searches = [
    "Endpoint - Emails By Source - Context Gen",
    "Endpoint - Emails By Destination Count - Context Gen"
]
```

### Example correlation search stanzas from this version and previous versions

The `savedsearches.conf` stanza for a correlation search looks as follows starting in 4.6.0.

```bash
[Access - Concurrent App Accesses - Rule]
action.correlationsearch = 0
action.correlationsearch.enabled = 1
action.correlationsearch.label = Concurrent Login Attempts Detected
action.email.sendresults = 0
action.notable = 0
action.notable.param.security_domain = access
action.notable.param.severity = medium
```
action.notable.param.rule_title = Concurrent Access Event Detected For $user$
action.notable.param.rule_description = Concurrent access attempts to $app1$ by $user$ from two different sources ($src1$, $src2$ ) have been detected.
action.notable.param.nes_fields = user
action.notable.param.drilldown_name = View access attempts by $user$
action.notable.param.drilldown_search = | datamodel Authentication search | search Authentication.user="$user$"
action.risk = 1
action.risk.param._risk_object = user
action.risk.param._risk_object_type = user
action.risk.param._risk_score = 20
alert.suppress = 1
alert.suppress.fields = user
alert.suppress.period = 86300s
alert.track = false
cron_schedule = 10 * * * *
description = Alerts on concurrent access attempts to an app from different hosts. These are good indicators of shared passwords and potential misuse.
disabled = True
dispatch.earliest_time = -70m@m
dispatch.latest_time = -5m@m
enableSched = 1
is_visible = false
request.ui_dispatch_app = SplunkEnterpriseSecuritySuite
search = | tstats `summariesonly` count from datamodel=Authentication.Authentication by _time,Authentication.app,Authentication.src,Authentication.user span=1s |
| `drop_dm_object_name("Authentication")` | eventstats dc(src) as src_count by app,user | search src_count>1 | sort 0 + _time |
| streamstats current=t window=2 earliest(_time) as previous_time,earliest(src) as previous_src by app,user | where (src!=previous_src) | eval time_diff=abs(_time-previous_time) | where time_diff<300

In previous versions of Splunk Enterprise Security, the savedsearches.conf and correlationsearches.conf definitions for the same correlation search would look as follows. savedsearches.conf

[Access - Concurrent App Accesses - Rule]
action.email.sendresults = 0
action.risk = 1
action.risk.param._risk_object = user
action.risk.param._risk_object_type = user
action.risk.param._risk_score = 20
alert.suppress = 1
alert.suppress.fields = user
alert.suppress.period = 86300s
alert.track = false
cron_schedule = 10 * * * *
disabled = True
dispatch.earliest_time = -70m@m
dispatch.latest_time = -5m@m
enableSched = 1
is_visible = false
request.ui_dispatch_app = SplunkEnterpriseSecuritySuite
search = | tstats `summariesonly` count from datamodel=Authentication.Authentication by _time,Authentication.app,Authentication.src,Authentication.user span=1s | `drop_dm_object_name("Authentication")` | eventstats dc(src) as src_count by app,user | search src_count>1 | sort 0 + _time | streamstats current=t window=2 earliest(_time) as previous_time,earliest(src) as previous_src by app,user | where (src!=previous_src) | eval time_diff=abs(_time-previous_time) | where time_diff<300
correlationsearches.conf

[Access - Concurrent App Accesses - Rule]
security_domain = access
severity = medium
rule_name = Concurrent Login Attempts Detected
description = Alerts on concurrent access attempts to an app from different hosts. These are good indicators of shared passwords and potential misuse.
rule_title = Concurrent Access Event Detected For $user$
rule_description = Concurrent access attempts to $app1$ by $user$ from two different sources( $src1$, $src2$ ) have been detected.
nes_fields = user
drilldown_name = View access attemps by $user$
drilldown_search = | datamodel Authentication Authentication search | search Authentication.user="$user$"
default_owner =
default_status =

Create sequence templates in Splunk Enterprise Security

The Event Sequencing Engine provides capabilities for threat detection that allow you to group correlation searches into batches of events, either in a specific sequence, by specific attributes, or both.

You create batches of events by defining a workflow to run correlation searches in an order of your choice, specifying what notable events would need to occur in order to advance to the next step.

The concept is similar to writing a script to automate the things that you might otherwise have to do manually when tracking a variety of notable events and
variables through a variety of correlation searches. The concept is also similar to that of meta notable events or named multi-vector notables, which are alerts that are generated by correlation searches monitoring for multiple specific conditions prior to raising the alert.

How sequence templates work

The Event Sequencing Engine runs as a real-time search and listens for incoming notable events and risk modifiers that are triggered by correlation searches. Security analysts can provide specifications on how sequenced events are constructed by using sequence templates. Once you have created a sequence template, it is available for execution within 5 minutes.

Sequence templates are stored in the `sequence_templates.conf` file.

The Event Sequencing Engine periodically stores information regarding the currently running sequence templates. This information can be viewed from the sequence lister page. See the status of a template.

Sequence template details

A sequence template defines the various constraints of constructing a sequence. It has three main components: start, transitions, and end. You can construct a sequence template using the editor.

The following diagram shows an example of the way that you can start with one correlation search (1), flow through any number of correlation searches in the transitions (2 through 5), and end with a final search (6).

Start

The start section defines match conditions for starting the execution of a template. Optionally, the start section can define state variables to store field values for the purpose of matching further notables or risk modifiers. State variables can also be used as outputs in the final sequenced event. Once the start condition is met, the event sequencing engine will start the execution of the corresponding sequence template.
Match conditions

The match condition defines the criteria for considering notable events or risk modifiers for transitioning through the phases in a template. The match condition has two parts that are evaluated successively, correlation search and expression.

<table>
<thead>
<tr>
<th>Match Conditions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation Search</td>
<td>The correlation search to match the source of the incoming notable or risk modifier. Wildcard matching (*) is supported on this field.</td>
</tr>
<tr>
<td>Expression</td>
<td>The expression allows you to compare any field from an incoming event with a static value or a state variable (see state for further information). Expressions follow Splunk style syntax in the format of <code>&lt;field&gt; &lt;comparator&gt; &lt;value&gt;</code>. Note that while similar to SPL syntax, expressions in the event sequencing engine are more restricted than in standard SPL syntax. For example, SPL doesn't enforce AND/OR operators for field searches, but the event sequencing engine does. Wildcard matching (*) and regular expressions are not supported in the expression section. You can also use brackets for grouping. You must use the logical operators of AND or OR in your grouping, such as: `host' = &quot;127.0.0.1&quot; AND ('dest' = &quot;example.com&quot; OR 'dest'=&quot;example.org&quot;). The NOT operator is not supported.</td>
</tr>
</tbody>
</table>

The expression is made up of field, comparison function, and value.

Field
The name of any SPL field in single quotes, such as: 'host', 'source', 'sourcetype', etc. Multivalue fields are supported, and an event is considered a match as long as one value matches.

Comparison function
The comparison function can be any of the following: =, !=, >, <, >=, <=. The following comparison functions force numeric comparisons: >=, <=, >, <.
The field value in double quotes, which can be in string format or in state_variable notation, such as: `host' = "127.0.0.1" or 'host' = "$host$".

Based on an example event in .csv format such as the following:

```
host, source, sourcetype
127.0.0.1, "Threat Detected", "nginx"
```

- An expression for matching on the host is `host' = "127.0.0.1".
- An expression for matching on any other source is `source' != "Threat Detected".

If you want to use assets and identities in expressions, configure asset and identity correlation with the enable for all sourcetypes option selected. This makes sure that identity and asset information is enriched during search time when receiving contents from the risk or notable index. See Configure asset and identity correlation in Splunk Enterprise Security.

**State**

The state provides a way to store values from matched events for the lifetime of a sequence. State can be stored at the start section and at each transition if the enforce ordering check box is unchecked. You cannot save a new state at the end step. These values can then be used for matching expressions in consecutive transitions. State can also be an output in the final sequenced event. If a multivalue is the output in the final sequenced event, it will be returned in a comma separated format. Once stored, state variables can be referenced using $variable_name$ syntax. State allows you to store important pieces of information for future matching. The state contains two parts, the field and the label.

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>The name of any SPL field that you want to capture for later use. State fields defined in the start section can be used in all transitions. But state fields defined in the transitions section will be available only to expressions in subsequent transitions.</td>
</tr>
<tr>
<td>State</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>Label</td>
<td>The label is the variable name for referring to the state field in a later search. The state_variable notation for referring to the label is similar to an SPL token in the way it is used to capture and pass values. The label is available only for use while the template is running. It does not persist when the template terminates or completes. The label cannot contain a dollar sign ($).</td>
</tr>
</tbody>
</table>

**Transitions**

The transitions section defines the sequence, either chronologically or in an order-independent way. You can define a series of match conditions to find the sequence. Each transition defines a title and a match condition.

**Chronological**

Transitions are matched chronologically by default. With the **enforce order** check box checked, the Event Sequencing Engine will check if notable events or risk modifiers match the completed transitions in the order specified. A transition is completed by matching an incoming event with a match condition. Given a sequence of correlation searches in the following order, with the **enforce order** check box checked for example, the notable events will be matched in order:

Start

1. Brute Force Access Behavior Detected
2. Uncommon Processes On Endpoint
3. Unusually Long Command Line
4. Suspicious Reg.exe Process
5. Web Uploads to Non-corporate Sites by Users

End

6. Abnormally High Number of Endpoint Changes By User

Transitions can only define state variables if the **enforce order** check box is checked. Enforcing the order provides a way to chronologically build a sequence. A state stored in an earlier transition is available for matching in later ones.
Not chronological

You can turn off chronological matching by unchecking the enforce order checkbox. With enforce order unchecked, the Event Sequencing Engine will check if notable events or risk modifiers match any of the incomplete transitions. Once matched, corresponding transitions will be considered complete. The order of events will not be considered. For example, given a sequence of correlation searches with the enforce order check box unchecked, you'll notice that notable events can match in any order:

Start

1. Brute Force Access Behavior Detected

Transitions

3. Unusually Long Command Line
2. Uncommon Processes On Endpoint
5. Web Uploads to Non-corporate Sites by Users
4. Suspicious Reg.exe Process

End

6. Abnormally High Number of Endpoint Changes By User

Wildcard

Transitions also support the same constructs for match conditions as in the start section. Since the correlation search field in the match condition allows wildcard match, it is possible to construct sequences that require forks. Transitions can define more than one next possible notable event or risk modifier. Given a wildcard correlation search sequence, for example:

The sequence can go in the following patterns:

Start

1. Brute Force Access Behavior Detected

Transitions

2. Option A or Option B, using a wildcard for two correlation searches. For example, a search of step_one or step_two by matching either one using the wildcard, such as step*.
4. Suspicious Reg.exe Process
5. Web Uploads to Non-corporate Sites by Users
6. Abnormally High Number of Endpoint Changes By User

**Aggregate**

Transitions can also be configured to aggregate notable events or risk modifiers that may happen after a transition match is found. If the **aggregate matches** check box is checked, the Event Sequencing Engine will add any notable events or risk modifiers that satisfy the match condition for one of the completed transitions. This can be used to add more context to the final sequenced event.

Consider a sequence of correlation searches like the following, where we have one correlation search that fires multiple notable events (Uncommon Processes On Endpoint) during the lifetime of our sequence:

**Start**

1. Brute Force Access Behavior Detected

**Transitions**

2. Uncommon Processes On Endpoint
3. Unusually Long Command Line
2. Uncommon Processes On Endpoint
4. Suspicious Reg.exe Process

**End**

6. Abnormally High Number of Endpoint Changes By User
If aggregate matches is unchecked, then there will only be one match for Uncommon Processes On Endpoint in the final sequenced event, even though it matched multiple times. If aggregate matches is checked, the event sequencing engine will try to match all new incoming notables and risk modifiers with completed transitions. In this case, after finding the first Uncommon Processes On Endpoint, the sequencing engine re-evaluates the next two Uncommon Processes On Endpoint notable events with match conditions and adds them to the final sequenced event if true.

**End**

The end section defines the termination criteria for a sequence template. A template can terminate if either of these two conditions are true:

- All transitions are complete and the event satisfying match condition is found. The event sequencing engine will consider this outcome as a successful run of a template and will trigger the sequenced event creation.
- The template has reached the configured max time to live (max_ttl). As the template has not reached its end state in the desired time, the event sequencing engine will discard this run and no sequenced event will be created.

**Sequenced event**

After the successful termination of a template, the output is a sequenced event. This sequenced event is the result of a template run and holds the necessary information for identifying a sequence. Sequenced events are written to the sequenced_events index. Sequence templates can be configured to use any of the state variables or statically configured values as output in the final sequenced events. The variables are stored and available for use only during the runtime of a template.

**Create a template**

You can create a template to run any number of searches that match your criteria.

The sequence template does not require any special capability to view, but requires the edit_sequence_template capability to manage sequence templates. By default, ES assigns the edit_sequence_template capability to the ess_admin role. An admin can assign it to other roles from the Permissions setting.
In the following scenario, you know that you're interested in detecting a prohibited application spawning the cmd.exe process. Once you've detected the process, you're interested in knowing if it's happening on your favorite computer, particularly if it starts creating new local admin accounts. Finally, you want to know if the user is making an abnormally high number of changes elsewhere. Because each system involved is set for logging at a different time interval, you are not necessarily interested in chronological order.

1. From the Splunk ES menu bar, select Configure > Content > Content Management > Create New Content > Sequence Template.
2. In the Sequence Template section, type a Name for your template, a Description for it, and select an App with which to run the search. If your template name has spaces, replace them with underscores.
3. In the Start section, add the following:
   1. Select the Correlation Search to begin with, such as Detect Prohibited Applications Spawning cmd.exe.
   2. Type the Expression to match on, such as 'dest' = "198.18.0.101"
   3. Type a State to store for use in a later correlation search, such as:
      ◊ Field: user
      ◊ Label: questionable_user
4. In the Transition section, do the following:
   1. Uncheck the Enforce Ordering check box.
   2. Type a Title for this section, such as: new local admin
   3. Select the Correlation Search to run next, such as: ESCU - Detect New Local Admin account - Rule.
   4. Type the Expression to match on, such as the state you saved earlier: 'user' = "$questionable_user$".
5. In the End section, add the following:
   1. Select the Correlation Search to end with, such as Change - Abnormally High Number of Endpoint Changes By User - Rule.
   2. Type the Expression to match on, such as the state you saved earlier: 'user' = "$questionable_user$".
   3. Select the Time Limit when the search should expire, such as 2 days.
6. In the Actions section, add the following:
   1. Type the Event Title that you want to see in the Incident Review, such as Prohibited cmd, new local account, high endpoint changes.
   2. Type the Description that you want to see in the Incident Review, such as The questionable user on my favorite computer is $questionable_user$.
3. Select the Urgency that you want to see in the Incident Review, such as **High**.
4. Select a Security Domain that you want to see in the Incident Review, such as **Access**.
7. Click **Save**.

**Enable or Disable a template**

Manage sequence templates individually by enabling or disabling each one. Enable or disable the template by performing the following steps:

1. From the Splunk ES menu bar, select **Configure > Content > Content Management**.
2. From the Type filter, select the **Sequence Template** option.
3. Check the check box for your Sequence Template.
4. Click **Edit selection > Enable** or **Edit selection > Disable**.

**Enable event sequencing**

Manage sequence templates as a whole by enabling or disabling the Event Event Sequencing Engine. The sequence templates will run only if the Event Sequencing Engine is enabled. The Event Sequencing Engine is disabled by default.

Enable the Event Sequencing Engine by performing the following steps:

1. From the Splunk ES menu bar, select **Configure > General > General Settings**.
2. (Optional) Type **Event Sequencing Engine** in the filter field.
3. Click **Enable** to enable the Event Sequencing Engine.

**Edit an existing template**

The sequence template does not require any special capability to view, but requires **edit_sequence_template** to manage sequence templates. By default, ES assigns the **edit_sequence_template** capability to the **ess_admin** role. An admin can always assign it to other roles from the Permissions setting.

You can edit all templates, whether they're enabled or disabled.

1. From the Splunk ES menu bar, select **Configure > Content > Content Management**.
2. From the Type filter, select the **Sequence Template** option.
3. (Optional) Click **Disable** to disable an enabled template.
4. Click the name of the search to edit the template parameters.

### See the status of a template

You can see which sequences are running or completed.

1. From the Splunk ES menu bar, select **Security Intelligence > Sequence Analysis**.
2. From the Showing filter, select the **Running Templates** or **Completed Templates**.
3. From the event information column, click the greater than (>) symbol to expand the display.

You can see which templates are running and their current status in terms of which events have been matched and how many transitions have been completed.

### Find the sequenced events generated by the event sequence template

Once you create a sequence template and it reaches the end state, the output displays as a sequenced event in the Incident Review dashboard. See Incident Review overview for information about using the dashboard.

To find the output from the sequence template search, do the following:

1. From the Splunk ES menu bar, select **Incident Review**.
2. Click the **Sequenced Event** filter to show only sequenced events.
3. (Optional) Sort by **Title**.
4. You will see the Event Title that you typed in the editor as the title of your sequenced event.
5. From the event information column, click the greater than (>) symbol to expand the display.

ES displays information specific to that sequence of events, such as the name and description, the state of each transition in the sequence, and the sequence expiration date. For example when we see Rare Process, then DDNS Activity, then Web Traffic, then a UBA-triggered DGA alert.
Execute the Event Sequencing Engine in an ad-hoc manner

When you create a template, the Event Sequencing Engine starts executing it within 5 minutes. Alternately, you can run the helper macro, `execute_sequence_template`. This macro takes two parameters: the template name and a Boolean expression indicating if a sequenced event is created or not. For example:

```
`execute_sequence_template(template_name, false)`
```

In this case, `false` means that the sequenced event will not be created.

This macro can be run over historical data, so you can find sequenced events in past notable events and risk modifiers. After running the macro, the Event Sequencing Engine returns sequenced events if any are found. You can only execute one template at a time. This macro is intended for explorations and fine tuning to manage sequence templates.

Set up adaptive response actions in Splunk Enterprise Security

Adaptive response actions allow you to gather information or take other action in response to the results of a correlation search or the details of a notable event. Splunk Enterprise Security includes several adaptive response actions. See
Included adaptive response actions.

You can add adaptive response actions and alert actions to correlation searches, or run adaptive response actions from notable events on the Incident Review dashboard. Collect information before you start your investigation to save time at triage by adding adaptive response actions to correlation searches. Take action at triage time by running adaptive response actions from the Incident Review dashboard.

The adaptive response actions that ship out of the box for ping, nbtstat, and nslookup are modified to support Splunk Cloud. Additional setup is required before configuring adaptive response actions from Splunk Cloud to on-premises infrastructure and services. See Set up an adaptive response relay from Splunk Cloud to an on-premises device.

Add new adaptive response actions


Audit adaptive response actions

Audit all adaptive response actions on the Adaptive Response Action Center.

Configure permissions for adaptive response actions

Restrict certain adaptive response actions to certain roles by adjusting the permissions for adaptive response actions in the alert actions manager. You can find information about the alert actions manager in the Splunk platform documentation.

- For Splunk Enterprise, see Using the alert actions manager in the Splunk Enterprise Alerting Manual.
- For Splunk Cloud, see Using the alert actions manager in the Splunk Cloud Alerting Manual.

In order to run adaptive response actions from the Incident Review dashboard that have credentials stored in the credential manager, you must have the appropriate capability.
• For Splunk platform version 6.5.0 and later, list_storage_passwords.
• For earlier Splunk platform versions, admin_all_objects.

Add an adaptive response action to a correlation search

1. On the Splunk Enterprise Security menu bar, click Configure > Content > Content Management.
2. Click an existing correlation search, or click Create New > Correlation Search.
3. Click Add New Response Action and select the response action you want to add.
4. Complete the fields for the action. If you want, add another response action.
5. Click Save to save all changes to the correlation search.

For instructions on configuring each of the adaptive response actions included with Splunk Enterprise Security, see Configure adaptive response actions for a correlation search in Splunk Enterprise Security. For instructions on configuring a custom adaptive response action, see the documentation for the app or add-on that supplied the adaptive response action.

Troubleshoot why an adaptive response action is not available to select

If an adaptive response action is not available to select on the correlation search editor or Incident Review, several things could be the cause.

• Your role may not have permissions to view and use the adaptive response action. See Using the alert actions manager in the Alerting Manual.
• Check the alert actions manager to determine if the adaptive response actions exist in Splunk platform. See Using the alert actions manager in the Alerting Manual.
• If the adaptive response actions from an add-on do not appear in Splunk Enterprise Security, but do appear in the alert actions manager, make sure that the add-on is being exported globally. See Make Splunk knowledge objects globally available in the Splunk Enterprise Admin Manual.
• If you can select the adaptive response action on the correlation search editor, but not on Incident Review, the adaptive response action might be an ordinary alert action, or the response action does not support ad hoc invocation. See Determine whether your action supports ad hoc invocation
Set up an adaptive response relay from a Splunk Cloud Enterprise Security search head to an on-premises device

Splunk Cloud customers can utilize adaptive response actions in Splunk Enterprise Security (ES) without exposing infrastructure controls and administration to the open internet. Adaptive response relay allows adaptive response actions to queue on the Splunk Cloud ES search head. These queued actions store metadata and search results that allow a separate proxy component to execute those adaptive response actions from within the on-premises environment.

You need to perform the following steps to set up adaptive response actions:

1. Install the technology add-on for adaptive response on your heavy forwarder.
2. Configure your Splunk Cloud ES search head with an API key.
3. Configure your on-premises heavy forwarder with an API key.
4. Configure your on-premises heavy forwarder with a modular action relay.
5. Configure your Splunk Cloud ES search head with a modular action worker.
6. Configure adaptive response actions for your Splunk Cloud ES search head.

Install the technology add-on for adaptive response on your heavy forwarder

For an on-premises heavy forwarder to perform adaptive response actions, you must install the actions on both the Splunk Cloud ES search head and the heavy forwarder. These actions are installed by default with ES in $SPLUNK_HOME/etc/apps/SA-ThreatIntelligence, but you need to install them manually on your heavy forwarder.

1. From the Splunk ES menu bar of the Splunk Cloud ES search head, select Configure > General > General Settings.
2. Locate the Distributed Configuration Management item.
3. Click Splunk_TA_AROnPrem to download the app.
4. Install the app on the heavy forwarder.
Configure your Splunk Cloud ES search head with an API key

The API key allows you to authenticate from the KV Store collection and CAM queue. You must create and manage your own API key. The API key follows a specific format, and it does not support two-factor authentication. For a Splunk Cloud environment that requires two-factor authentication, turn off this feature by not setting an API key.

1. Retrieve the heavy forwarder’s `servername` value by running the following search on the heavy forwarder:

   `| rest /services/server/info | table serverName`

   Take note of this name because you will need it when you set up your heavy forwarder. In this example the `servername` value is `hf1`.

2. Install the Common Information Model version 4.12 or higher on the Splunk Cloud ES search head, if you haven’t done so already.

3. Generate an API key on the Splunk Cloud ES search head.
   1. From the Splunk ES menu bar, select Configure > CIM Setup, and then click Manage API Key.
   2. In the Key Name field, type the `servername` value that you retrieved: in this case, `hf1`.
   3. To generate the API key value, type the following URI into a browser window of your Splunk Cloud ES search head:


   This will return a random 128-character string in the valid format.
   4. Copy and paste the string into the API Key field.

      Take note of this string because you will use it when you configure your heavy forwarder.

Configure your on-premises heavy forwarder with an API key

An API key allows the heavy forwarder to authenticate against the Splunk Cloud ES search head. The API key on the heavy forwarder must match the API key on the Splunk Cloud ES search head.

1. Install the Common Information Model version 4.12 or higher on the heavy forwarder, if you haven’t done so already.

2. From the Splunk ES menu bar, select Configure > CIM Setup, and then click Manage API Key.
   1. On the key management page, in the Key Name field, type the `servername` value that you took note of in the Configure your Splunk Cloud ES search head with an API key section.
2. On the key management page, in the API Key field, paste the string that you took note of in the Configure your Splunk Cloud ES search head with an API key section.

Configure your on-premises heavy forwarder with a modular action relay

The modular action relay is where you set the heavy forwarder to retrieve queued search results from a Splunk Cloud correlation search so that it can execute adaptive response actions on premises.

1. From the Splunk ES menu bar, select Settings > Data inputs.
2. Scroll down to Modular Action Relay and click + Add new.
   1. Type a Name for the relay, such as relay1.
   2. Type the Remote Search Head URI in the format of protocol://servername:port, such as:
      8089 is the default port for Splunk Cloud.
   3. Type a Description for the relay, such as remote search head.
   4. Type the Api Key Name (the serverName value that you took note of in the Configure your Splunk Cloud ES search head with an API key section), such as hf1.
   5. Type True in the Verify field to verify the certificates between the worker and the Splunk Cloud ES search head.
   6. (Optional) If your ES search head is using a privately signed SSL certificate, add your root CA certificate chain file to the Splunk_SA_CIM/auth directory on the heavy forwarder and provide its file name to this input in the Client Certificate field. If your search head is in Splunk Cloud, this is not an issue.

Configure your Splunk Cloud ES search head with a modular action worker

The modular action worker is where you specify the serverName value of the heavy forwarder that the Splunk Cloud ES search head will queue search results for.

1. From the Splunk ES menu bar of the Splunk Cloud ES search head, select Configure > Content > Content Management.
2. Type Modular Action Workers in the search filter.
3. Click the name of the Modular Action Workers lookup.
4. Add a worker set and the name of the worker. The worker_set value is used when running adaptive response actions from ES. The cam_worker is the actual name of the heavy forwarder that will execute the actions.

1. Leave the row with local as-is because it allows for local execution of actions on the Splunk Cloud ES search head.
2. In the worker_set column, type a descriptive name for the heavy forwarder: onprem.
3. In the cam_workers column, type the serverName value that you took note of in the Configure your Splunk Cloud ES search head with an API key section, such as "["hf1"]". The format requires array-style notation of "["nameofworker"]" with each worker name in quotes and separated with commas in CSV encoded JSON. An example of multiple workers is "[""hf1",""hf2""""].

Configure adaptive response actions for your Splunk Cloud ES search head

See Configure adaptive response actions for a correlation search in Splunk Enterprise Security for information about configuring adaptive response actions in general.

The Worker Set drop-down menu is specific to adaptive response actions on a Splunk Cloud ES search head. After completing the in the Configure your Splunk Cloud ES search head with a modular action worker section, when you create or edit a correlation search to add an adaptive response action, the drop-down menu includes the worker_set that you created.

Select the worker_set to use for executing those adaptive response actions from within the on-premises environment.

The results of adaptive response actions, ping for example, are found in "index=main source=ping".

Troubleshoot adaptive response relay from Splunk Cloud ES search head to an on-premises device

The adaptive response modular input runs on a default interval of 2 minutes. You can adjust this based on your needs. A more frequent execution time will place additional load on the Splunk Cloud ES search head. To avoid performance problems with the CAM queue, adjust the interval to run less frequently, and do not set it below 10 seconds.
Ensure that your heavy forwarder is configured to forward its data to your indexers. This includes forwarding data from the relayed modular actions. You can run a search similar to the following search on your ES search head to verify that data is forwarding, where hf1 is the name of your heavy forwarder:

```
index="cim_modactions" host=hf1
```

If this search never returns results, then your heavy forwarder is experiencing issues connecting to the ES search head.

**Configure adaptive response actions for a correlation search in Splunk Enterprise Security**

As a Splunk Enterprise Security admin, you can configure which adaptive response actions that a correlation search triggers.

Analysts can run some adaptive response actions on an ad hoc basis from Incident Review. See Included adaptive response actions with Splunk Enterprise Security in *Use Splunk Enterprise Security*.

Splunk Enterprise Security includes several adaptive response actions, and you can obtain additional ones from add-ons available on Splunkbase.

**Included adaptive response actions**

Splunk Enterprise Security includes several adaptive response actions.

- Create a notable event.
- Modify a risk score with a risk modifier.
- Send an email.
- Run a script.
- Start a stream capture with Splunk Stream.
- Ping a host.
- Run Nbtstat.
- Run Nslookup.
- Add threat intelligence.
- Create a Splunk Web message.
Create a notable event

Create a notable event when the conditions of a correlation search are met.

1. On the Splunk Enterprise Security menu bar, click **Configure > Content > Content Management**.
2. Click an existing correlation search, or click **Create New > Correlation Search**.
3. Click **Add New Response Action** and select **Notable** to add a notable event.
4. Type a **Title** of the notable event on the **Incident Review** dashboard. Supports variable substitution from the fields in the matching event.
5. Type a **Description** of the notable event. Supports variable substitution from the fields in the matching event.
6. Select the **Security Domain** of the notable event from the drop-down list.
7. Select the **Severity** of the notable event from the drop-down list. The severity is used to calculate the **Urgency** of a notable event.
8. (Optional) Change the default owner of the notable event from the system default, **unassigned**.
9. (Optional) Change the default status of the notable event from the system default, **New**.
10. Type a drill-down name for the **Contributing Events** link in the notable event.
11. Type a drill-down search for the **Contributing Events** link in the notable event.
12. In the **Drill-down earliest offset** field, type the amount of time before the time of the triggering event to look for related events for the **Contributing Events** link in the notable event. For example, **2h** to look for contributing events 2 hours before the triggering event.
13. In the **Drill-down latest offset** field, type the amount of time after the time of the triggering event to look for related events for the **Contributing Events** link in the notable event. For example, **1h** to look for contributing events 1 hour after the triggering event.
14. (Optional) Add **Investigation Profiles** that apply to the notable event. For example, add an investigation profile that fits a use case of "Malware" to malware-related notable events.
15. (Optional) Add fields that contain assets in **Asset Extraction** to extract the field values and add them to the investigation workbench as artifacts when the notable event is added to an investigation.
16. (Optional) Add fields that contain identities in **Identity Extraction** to extract the field values and add them to the investigation workbench as an
artifact when the notable event is added to an investigation.

17. Type Next Steps for an analyst to take after triaging a notable event. Type text or click Insert Adaptive Response Action to reference a response action in the text of the next steps. You can only type plain text and links to response actions in the next steps field. Use next steps if you want to recommend response actions that should be taken in a specific order. For example, ping a host to determine if it is active on the network. If the host is active, increase the risk score by 100, otherwise, increase the risk score by 50.

18. Select Recommended Actions to complement the next steps. From the list of all adaptive response actions, click the name of an action that you recommend as a triage or investigation step for this notable event to add it to the list of recommended actions that analysts can take for this notable event. You can add as many recommended actions as you like. Use recommended actions to recommend response actions that do not need to be taken in a specific order. For example, increase the risk score on a host and perform an nslookup on a domain name.

Modify a risk score with a risk modifier

Modify a risk score as a result of a correlation search or in response to notable event details with the Risk Analysis adaptive response action. The risk adaptive response action creates a risk modifier event. You can view the risk modifier events on the Risk Analysis dashboard in Enterprise Security.

1. Click Add New Response Action and select Risk Analysis.
2. Type the score to assign to the risk object.
3. Type a field in the search to apply the risk score to for the Risk Object Field. For example, type "src" to specify the source field.
4. Select the Risk Object Type to apply the risk score to.

See Assign risk to an object in Use Splunk Enterprise Security for other ways to modify risk scores.

Send an email

Send an email as a result of a correlation search match.

Prerequisite
Make sure that the mail server is configured in the Splunk platform before setting up this response action.

- For Splunk Enterprise, see Configure email notification settings in the Splunk Enterprise Alerting Manual.
- For Splunk Cloud, see Configure email notification settings in the Splunk Cloud Alerting Manual.

Steps

1. Click Add New Response Action and select Send email.
2. In the To field, type a comma-separated list of email addresses to send the email to.
3. (Optional) Change the priority of the email. Defaults to Lowest.
4. Type a subject for the email. The email subject defaults to "Splunk Alert: $name$", where $name$ is the correlation search Search Name.
5. Type a message to include as the body of the email. Defaults to "The scheduled report '$name$' has run."
6. Select the check boxes of the information you want the email message to include.
7. Select whether to send a plain-text or HTML and plain-text email message.

Run a script

Run a script stored in $SPLUNK_HOME/bin/scripts.

1. Click Add New Response Action and select Run a script.
2. Type the filename of the script.

More information about scripted alerts can be found in the Splunk platform documentation.

- For Splunk Enterprise, see Configure scripted alerts in the Splunk Enterprise Alerting Manual.
- For Splunk Cloud, see Configure scripted alerts in the Splunk Cloud Alerting Manual.

Start a stream capture with Splunk Stream

Start a stream capture to capture packets on the IP addresses of the selected protocols over the time period that you select. You can view the results of the capture session on the Protocol Intelligence dashboards.

1. Click **Add New Response Action** and select **Stream Capture** to start a packet capture in response to a correlation search match.
2. Type a **Description** to describe the stream created in response to the correlation search match.
3. Type a **Category** to define the type of stream capture. You can view streams by category in Splunk Stream.
4. Type the comma-separated event fields to search for IP addresses for the Stream capture. The first non-null field is used for the capture.
5. Type the comma-separated list of protocols to capture.
6. Select a **Capture duration** to define the length of the packet capture.
7. Type a **Stream capture limit** to limit the number of stream captures started by the correlation search.

**Ping a host**

Determine whether a host is still active on the network by pinging the host.

1. Click **Add New Response Action** and select **Ping**.
2. Type the event field that contains the host that you want to ping in the **Host Field**.
3. Type the number of maximum results that the ping returns. Defaults to 1.

**Run nbtstat**

Learn more about a host and the services that the host runs by running nbtstat.

1. Click **Add New Response Action** and select **Nbtstat**.
2. Type the event field that contains the host that you want to run the nbtstat for in the **Host Field**.
3. Type the number of maximum results that the nbtstat returns. Defaults to 1.

**Run nslookup**

Look up the domain name of an IP address, or the IP address of a domain name, by running nslookup.

1. Click **Add New Response Action** and select **Nslookup**.
2. Type the event field that contains the host that you want to run the
nslookup for in the **Host Field**.
3. Type the number of maximum results that the nslookup returns. Defaults
to 1.

**Add threat intelligence**

Create threat artifacts in a threat collection.

1. Click **Add New Response Action** and select **Add Threat Intelligence**.
2. Select the **Threat Group** to attribute this artifact to.
3. Select the **Threat Collection** to insert the threat artifact into.
4. Type the **Search Field** that contains the value to insert into the threat
artifact.
5. Type a **Description** for the threat artifact.
6. Type a **Weight** associated with the threat list. Defaults to 1.
7. Type a number of **Max Results** to specify the number of results to
process as threat artifacts. Each unique search field value counts as a
result. Defaults to 100.
Assets and Identities

Add asset and identity data to Splunk Enterprise Security

Splunk Enterprise Security uses an asset and identity system to correlate asset and identity information with events to enrich and provide context to your data. This system takes information from external data sources to populate lookups, which Enterprise Security correlates with events at search time.

You have choices for registering asset and identity data in ES:

- Manually register asset and identity data in Asset and Identity Manger
- Use LDAP to register data in Asset and Identity Manger

Manually register asset and identity data in Asset and Identity Manger

Do the following to manually add asset and identity data to ES to take advantage of asset and identity correlation:

2. Format the asset or identity list as a lookup in Splunk Enterprise Security.
3. Configure a new asset or identity list in Splunk Enterprise Security.
5. Verify that your asset or identity data was added to Splunk Enterprise Security.

Use LDAP to register data in Asset and Identity Manger

Do the following to use LDAP to register asset and identity data in ES to take advantage of asset and identity correlation.

2. Create a lookup from your current LDAP data in Splunk Enterprise Security.
3. Verify that your asset or identity data was added to Splunk Enterprise Security.
See also

Lookups that store merged asset and identity data

Asset and identity fields after processing in Splunk Enterprise Security

How Splunk Enterprise Security processes and merges asset and identity data

Collect and extract asset and identity data in Splunk Enterprise Security

Collect and extract your asset and identity data in order to add it to Splunk Enterprise Security. In a Splunk Cloud deployment, work with Splunk Professional Services to design and implement an asset and identity collection solution.

1. Determine where the asset and identity data in your environment is stored.
2. Collect and update your asset and identity data automatically to reduce the overhead and maintenance that manual updating requires and improve data integrity.

- Use Splunk DB Connect or another Splunk platform add-on to connect to an external database or repository.
- Use scripted inputs to import and format the lists.
- Use events indexed in the Splunk platform with a search to collect, sort, and export the data to a list.

Suggested collection methods for assets and identities.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Asset or Identity data</th>
<th>Collection methods</th>
</tr>
</thead>
<tbody>
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<td>Active Directory</td>
<td>Both</td>
<td>SA-ldapsearch and a custom search.</td>
</tr>
<tr>
<td></td>
<td>Both</td>
<td>SecKit Windows Add On for ES Asset and Identities *</td>
</tr>
<tr>
<td>LDAP</td>
<td>Both</td>
<td>SA-ldapsearch and a custom search.</td>
</tr>
<tr>
<td>CMDB</td>
<td>Asset</td>
<td>DB Connect for integrating with 3rd Party structured data sources, and a custom search.</td>
</tr>
<tr>
<td>Technology</td>
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<tr>
<td>-------------------------------</td>
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<td>ServiceNow</td>
<td>Both</td>
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<tr>
<td>Bit9</td>
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<td>Cisco ISE</td>
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<tr>
<td>Microsoft SCOM</td>
<td>Asset</td>
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<tr>
<td>Okta</td>
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<td>Splunk Add-on for Okta and a custom search. *</td>
</tr>
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<td>Sophos</td>
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<td>Splunk Add-on for Symantec Endpoint Protection and a custom search.</td>
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<tr>
<td>Amazon Web Services (AWS)</td>
<td>Asset</td>
<td>SecKit AWS Add On for ES Asset and Identities *</td>
</tr>
<tr>
<td>Configuration Management Database (CMDB)</td>
<td>Asset</td>
<td>SecKit SA Common tools for populating assets and identities in Enterprise Security and PCI apps *</td>
</tr>
</tbody>
</table>

* Not officially supported for use through a wizard setup, but available for manual setup.

**Next step**

Format an asset or identity list as a lookup in Splunk Enterprise Security

**Format an asset or identity list as a lookup in Splunk Enterprise Security**

Format your collected asset or identity data into a lookup file so that it can be processed by Splunk Enterprise Security.
Prerequisites

- Collect and extract asset and identity data for Splunk Enterprise Security

Steps

1. Create a plain text, CSV-formatted file with Unix line endings and a .csv file extension.
2. Use the correct headers for the CSV file. See Asset lookup header or Identity lookup header for the headers expected by Splunk Enterprise Security.
3. Populate the rows of the CSV with the asset or identity fields. See Asset lookup fields or Identity lookup fields for reference.

For an example asset list, review the Demonstration Assets lookup.

- Locate the list in Splunk Web by navigating to Configure > Content > Content Management.
- Locate the list in the file system, the demo_assets.csv file is located in the SA-IdentityManagement/lookups/ directory.

If you use a custom search to generate a lookup, make sure that the lookup produced by the search results contains fields that match the headers.

Next step

Configure the new asset or identity list in Splunk Enterprise Security

Asset and identity lookup configurations

Enterprise Security manages specific props.conf settings as part of the asset and identity framework. In order for these files to be configured properly, all configurations need to be populated in the SPLUNK_HOME/etc/apps/SA-IdentityManagement/local/props.conf file. If there are existing identity correlation lookup definitions in the SPLUNK_HOME/etc/apps/SA-IdentityManagement/default/props.conf file, remove them so they can be managed by the asset and identity framework.

Asset lookup header

ip,mac,nt_host,dns,owner,priority,lat,long,city,country,bunit,category,pci_domain,is_ex
Asset lookup fields

Populate the following fields in an asset lookup.

To add multi-homed hosts or devices to the asset list, add each IP address to the `ip` field for the host, pipe-delimited. Multi-homed support is limited, and having multiple hosts with the same IP address on different network segments can cause conflicts in the merge process.

<table>
<thead>
<tr>
<th>Field</th>
<th>Data type</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip</td>
<td>pipe-delimited numbers</td>
<td>A pipe-delimited list of single IP address or IP ranges. An asset is required to have an entry in at least one of the key fields such as: <code>ip</code>, <code>mac</code>, <code>nt_host</code>, or <code>dns</code> fields. All of the key fields are multi-value fields.</td>
<td>2.0.0.0/8</td>
</tr>
<tr>
<td>mac</td>
<td>pipe-delimited strings</td>
<td>A pipe-delimited list of MAC address. An asset is required to have an entry in at least one of the key fields such as: <code>ip</code>, <code>mac</code>, <code>nt_host</code>, or <code>dns</code> fields. All of the key fields are multi-value fields.</td>
<td>00:25:bc:42:f4:60</td>
</tr>
<tr>
<td>nt_host</td>
<td>pipe-delimited strings</td>
<td>A pipe-delimited list of Windows machine names. An asset is</td>
<td>ACME-0005</td>
</tr>
</tbody>
</table>
required to have an entry in at least one of the key fields such as: `ip`, `mac`, `nt_host`, or `dns` fields. All of the key fields are multi-value fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Data type</th>
<th>Description</th>
<th>Example values</th>
</tr>
</thead>
<tbody>
<tr>
<td>dns</td>
<td>pipe-delimited</td>
<td>A pipe-delimited list of DNS names. An asset is required to have an entry in at least one of the key fields such as: <code>ip</code>, <code>mac</code>, <code>nt_host</code>, or <code>dns</code> fields. All of the key fields are multi-value fields.</td>
<td>acme-0005.corp1.acmetech.org</td>
</tr>
<tr>
<td>owner</td>
<td>string</td>
<td>The user or department associated with the device</td>
<td><a href="mailto:f.prefect@acmetech.org">f.prefect@acmetech.org</a>, DevOps, Bill</td>
</tr>
<tr>
<td>priority</td>
<td>string</td>
<td><strong>Recommended.</strong> The priority assigned to the device for calculating the <strong>Urgency</strong> field for notable events on Incident Review. An &quot;unknown&quot; priority reduces the assigned <strong>Urgency</strong> by</td>
<td>unknown, low, medium, high or critical.</td>
</tr>
<tr>
<td>Field</td>
<td>Data type</td>
<td>Description</td>
<td>Example values</td>
</tr>
<tr>
<td>-------</td>
<td>-----------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>lat</td>
<td>string</td>
<td>The latitude of the asset in decimal degrees, using +/- to indicate direction.</td>
<td>37.780080</td>
</tr>
<tr>
<td>long</td>
<td>string</td>
<td>The longitude of the asset in decimal degrees, using +/- to indicate direction.</td>
<td>-122.420170</td>
</tr>
<tr>
<td>city</td>
<td>string</td>
<td>The city in which the asset is located</td>
<td>Chicago</td>
</tr>
<tr>
<td>country</td>
<td>string</td>
<td>The country in which the asset is located</td>
<td>USA</td>
</tr>
<tr>
<td>bunit</td>
<td>string</td>
<td>Recommended. The business unit of the asset. Used for filtering by dashboards in Splunk Enterprise Security.</td>
<td>EMEA, NorCal</td>
</tr>
<tr>
<td>category</td>
<td>pipe-delimited strings</td>
<td>Recommended. A pipe-delimited list of logical classifications</td>
<td>server</td>
</tr>
<tr>
<td>Field</td>
<td>Data Type</td>
<td>Description</td>
<td>Example values</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>pci_domain</td>
<td>pipe-delimited strings</td>
<td>A pipe-delimited list of PCI domains. See Configure assets in the Splunk App for PCI Compliance Installation and Configuration Manual.</td>
<td>cardholder, trust</td>
</tr>
<tr>
<td>is_expected</td>
<td>boolean</td>
<td>Indicates whether events from this asset should always be expected. If set to true, the Expected Host Not Reporting correlation search performs an adaptive response action when this asset stops reporting events.</td>
<td>&quot;true&quot;, or blank to indicate &quot;false&quot;</td>
</tr>
<tr>
<td>should_timesync</td>
<td>boolean</td>
<td>Indicates whether this asset must be monitored for time-sync events. It set to true, the Should</td>
<td>&quot;true&quot;, or blank to indicate &quot;false&quot;</td>
</tr>
</tbody>
</table>
Timesync Host Not Syncing correlation search performs an adaptive response action if this asset does not report any time-sync events from the past 24 hours.

<table>
<thead>
<tr>
<th>Field</th>
<th>Data type</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>should_update</td>
<td>boolean</td>
<td>Indicates whether this asset must be monitored for system update events.</td>
<td>&quot;true&quot;, or blank to indicate &quot;false&quot;</td>
</tr>
<tr>
<td>requires_av</td>
<td>boolean</td>
<td>Indicates whether this asset must have anti-virus software installed.</td>
<td>&quot;true&quot;, or blank to indicate &quot;false&quot;</td>
</tr>
</tbody>
</table>

**Identity lookup header**

`identity, prefix, nick, first, last, suffix, email, phone, managedBy, priority, bunit, category, watchlist, startDate, endDate, work_city, work_country, work_lat, work_long`

**Identity lookup fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Data type</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>identity</td>
<td>pipe-delimited strings</td>
<td><strong>Required.</strong> A pipe-delimited list of username strings representing the identity. After the merge process completes, this</td>
<td>a.vanhelsing</td>
</tr>
<tr>
<td>Field</td>
<td>Data type</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>-------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>prefix</td>
<td>string</td>
<td>Prefix of the identity.</td>
<td>Ms., Mr.</td>
</tr>
<tr>
<td>nick</td>
<td>string</td>
<td>Nickname of an identity.</td>
<td>Van Helsing</td>
</tr>
<tr>
<td>first</td>
<td>string</td>
<td>First name of an identity.</td>
<td>Abraham</td>
</tr>
<tr>
<td>last</td>
<td>string</td>
<td>Last name of an identity.</td>
<td>Van Helsing</td>
</tr>
<tr>
<td>suffix</td>
<td>string</td>
<td>Suffix of the identity.</td>
<td>M.D., Ph.D</td>
</tr>
<tr>
<td>email</td>
<td>string</td>
<td>Email address of an identity.</td>
<td><a href="mailto:a.vanhelsing@acmetech.org">a.vanhelsing@acmetech.org</a></td>
</tr>
<tr>
<td>phone</td>
<td>string</td>
<td>A multi-value field for telephone number of an identity.</td>
<td>123-456-7890</td>
</tr>
<tr>
<td>managedBy</td>
<td>string</td>
<td>A username representing the manager of an identity.</td>
<td><a href="mailto:phb@acmetech.org">phb@acmetech.org</a></td>
</tr>
<tr>
<td>priority</td>
<td>string</td>
<td><strong>Recommended.</strong> The priority assigned to the identity for calculating the Urgency field for notable events on Incident Review.</td>
<td>unknown, low, medium, high or critical.</td>
</tr>
</tbody>
</table>
An "unknown" priority reduces the assigned **Urgency** by default. For more information, see How urgency is assigned to notable events in Splunk Enterprise Security.

<table>
<thead>
<tr>
<th>Field</th>
<th>Data type</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>bunit</td>
<td>string</td>
<td><strong>Recommended.</strong> A group or department classification for identities. Used for filtering by dashboards in Splunk Enterprise Security.</td>
<td>Field Reps, ITS, Products, HR</td>
</tr>
<tr>
<td>category</td>
<td>pipe-delimited strings</td>
<td><strong>Recommended.</strong> A pipe-delimited list of logical classifications for identities. Used for asset and identity correlation and categorization. See Asset/Identity Categories.</td>
<td>Privileged</td>
</tr>
<tr>
<td>watchlist</td>
<td>boolean</td>
<td>Marks the identity for activity monitoring.</td>
<td>Accepted values: &quot;true&quot; or empty. See User Activity Monitoring in this manual.</td>
</tr>
<tr>
<td>startDate</td>
<td>string</td>
<td></td>
<td>Formats: %m/%d/%Y %H:%M, %m/%d/%y %H:%M</td>
</tr>
<tr>
<td>Field</td>
<td>Data type</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------</td>
<td>--------------------------------------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>endDate</td>
<td>string</td>
<td>The end or termination date of an identity.</td>
<td>Formats: %m/%d/%Y %H:%M, %m/%d/%y %H:%M</td>
</tr>
<tr>
<td>work_city</td>
<td>string</td>
<td>The primary work site City for an identity.</td>
<td></td>
</tr>
<tr>
<td>work_country</td>
<td>string</td>
<td>The primary work site Country for an identity.</td>
<td></td>
</tr>
<tr>
<td>work_lat</td>
<td>string</td>
<td>The latitude of primary work site City in decimal degrees, using +/- to indicate direction.</td>
<td>37.780080</td>
</tr>
<tr>
<td>work_long</td>
<td>string</td>
<td>The longitude of primary work site City in decimal degrees using +/- to indicate direction.</td>
<td>-122.420170</td>
</tr>
</tbody>
</table>

**Configure a new asset or identity list in Splunk Enterprise Security**

Configure a new asset or identity lookup in Splunk Enterprise Security. This multistep process adds the lookup in Splunk Enterprise Security and defines the lookup for the merge process.

**Prerequisites**

2. Format the asset or identity list as a lookup in Splunk Enterprise Security.
Steps

1. Add the new lookup table file
2. Set permissions on the lookup table file to share it with Splunk Enterprise Security
3. Add a new lookup definition
4. Set permissions on the lookup definition to share it with Splunk Enterprise Security

Add the new lookup table file

These lookup table files are consumed by the asset and identity framework and merged together. The product of the merge is called an "expanded lookup."

1. From the Splunk menu bar, select Settings > Lookups > Lookup table files.
2. Click New.
4. Select the lookup file to upload.
5. Type the Destination filename that the lookup table file should have on the search head. The name should include the filename extension.
   For example, network_assets_from_CMDB.csv
6. Click Save to save the lookup table file and return to the list of lookup table files.

In a distributed environment, these lookup table files are not replicated from the search heads to the indexers. Only the expanded lookup is replicated to the indexers. However, these lookup files are still replicated between search heads. If an asset or identity lookup table file grows in excess of 1GB+, it should be broken down into smaller files (for example, by location or by type or by easily identifiable category). When making changes to lookup files, only the updated files are replicated across search heads, reducing bundle sizes.

Set permissions on the lookup table file to share it with Splunk Enterprise Security

1. From Lookup table files, locate the new lookup table file and select Permissions.
2. Set Object should appear in to All apps.
3. Set Read access for Everyone.
4. Set Write access for admin or other roles.
5. Click Save.
Add a new lookup definition

1. From the Splunk menu bar, select Settings > Lookups > Lookup definitions.
2. Click New.
4. Type a name for the lookup source. This name must match the name defined later in the input stanza definition on the Identity Management dashboard. For example, network_assets_from_CMDB.
5. Select a Type of File based.
6. Select the lookup table file created. For example, select network_assets_from_CMDB.csv.
7. Click Save.

Set permissions on the lookup definition to share it with Splunk Enterprise Security

1. From Lookup definitions, locate the new lookup definition and select Permissions.
2. Set Object should appear in to All apps.
3. Set Read access for Everyone.
4. Set Write access for admin or other roles.
5. Click Save.

Next step

Manage assets and identities in Splunk Enterprise Security.

Manage assets and identities in Splunk Enterprise Security

Use the Asset and Identity Management page to enrich and manage asset and identity data using lookups. The Asset and Identity Management interface replaces the previously separate menus for Identity Management, Identity Correlation, and Identity Lookup Configuration. You need to have the edit_modinput_identity_manager capability to use it. See Configure users and roles in the Installation and Upgrade Manual.

When identity manager runs, it processes all of the asset and identity input
configurations that have changed. If the source has been updated, identity manager dispatches the SPL created by a custom-built search.

The SPL search uses a custom search command that handles the merging and updating of new data to existing data. The custom search command merges data based on policies that you define here.

Assets and identities that need to be deleted are updated in the KV store with a \_delete flag set to True so that the delete operation can persist and be completed at a later time.

The custom search command returns the merged data, which is updated or inserted to the KV store using outputlookup append=T. The identity manager checks and processes rows that are marked for deletion.

If you have customized the menu bar in Splunk Enterprise Security, the Asset and Identity Management navigation and page do not display. See Restore the default navigation to restore.

**Prerequisites**

Perform the following prerequisite tasks:

2. Format the asset or identity list as a lookup in Splunk Enterprise Security.
3. Configure a new asset or identity list in Splunk Enterprise Security.

**Create an Asset Lookup Configuration**

The asset lookup configuration settings create the policy that updates the inputs.conf file to point to a lookup and update your assets. When new items are added or current items are updated, the change takes effect in 5 minutes.

*Add an asset input stanza for the lookup source*

To add a new asset input source, complete the following steps:

1. From the Splunk Enterprise Security menu bar, select Configure > Data Enrichment > Asset and Identity Management.
2. Click the Asset Lookup Configuration tab.
3. Click New.
4. In the New Asset Manager, do the following:
   1. Since you uploaded a CSV source file of assets in a prerequisite step, select the corresponding transforms.conf definition from the Source drop-down list.
   2. You can provide a name for the asset list stanza, but matching the source file name is a good idea.
   3. Enter a descriptive category for this asset list, such as web_servers or west_coast_servers.
   4. Enter a detailed description of the contents of this asset list.
   5. Check the **Blacklist** check box to exclude the lookup file from bundle replication.
      The asset and identity source lookup files are excluded from bundle replication in an indexer cluster by default. The merged lookup files are still included in bundle replication to support asset and identity correlation. Changing the default to include asset and identity lookup files in bundle replication might reduce system performance. See Knowledge bundle replication overview in the Splunk Enterprise Distributed Search manual.
   6. In **Lookup List Type**, **asset** is selected for you.
   7. In **Lookup Field Exclusion List**, select fields for the merge process to ignore. This excludes the fields and those values from the KV store collections for that particular lookup. You might use this in the case where you have a field in your source file that you don't want to rely on for information.
   8. Click **Save**.

**Rank the order for merging assets**

Any new asset list gets added to the bottom of the list by default. You can rank the order of this list to determine priority for merging assets. If an asset exists in multiple source files as a single value or exists multiple times in the same source file, this ranking is the weighted order for merging them. By default, the single value asset fields are as follows:

- is_expected
- priority
- requires_av
- should_timesync
- should_update

These are the fields where the rank takes effect. For example, If you’re merging two assets and they both have the is_expected field value, you need to choose
one to take precedence. The row at the top of the list takes precedence and the merge process uses that value, as opposed to the row that's ranked second.

To change the rank, do the following from the **Asset Lookup Configuration** tab:

1. Drag and drop the rows of the table into a new order.
2. When finished reordering, click **Save Ranking**.

Ranking is not considered for a multivalue field. The merge process combines all the values into the field, and then removes the duplicates.

Key fields are **dns**, **ip**, **mac**, and **nt_host**. If you store extra information in your key fields, such as the same IP address assigned to multiple systems in pipe-delimited lists, these duplicate IP addresses are now merged together as one asset. Make sure that the information in your key fields either belongs to the same asset or does not overlap.

**Disable or enable asset lookups**

You can disable or enable an asset lookup input. Disabling an input does not delete the data from the associated lookup from Splunk Enterprise Security. Disabling prevents the contents of the corresponding list from being included in the merge process. Enabling a disabled input allows the associated list to be merged at the next scheduled merge of the asset or identity data.

To disable an asset lookup, do the following from the **Asset Lookup Configuration** tab:

1. Navigate to the **Status** column.
2. Do one of the following options:
   - Click **Disable** to disable an input.
   - Click **Enable** to enable a disabled input.

Starting with version 5.0.0, asset and identity lookup inputs are disabled by default after a new installation. However, local settings are respected after an upgrade.

**Asset Settings**

You can add a new asset field or enable case sensitive matching.
Add a new asset field

This is the list of asset fields that are added both by default and by entering custom fields manually. You can add up to 20 custom fields for your lookups. Key fields, such as dns, ip, mac, nt_host are non-editable. However, for custom and default fields you can configure whether the field is a tag field, a multivalue field, or both.

To add a new custom asset field, do the following:

1. From the Splunk Enterprise Security menu bar, select Configure > Data Enrichment > Asset and Identity Management.
2. Click the Asset Settings tab.
3. Click Add New Field.
4. In the New Asset Field dialog box, do the following:
   1. Enter a field name.
   2. Check the Multivalue check box if the field can output multiple values.
   3. Check the Tag check box if the field can be used as an asset tag. This is a helper field for holding additional values that you want to look up, in addition to the key fields. This is not the same as tagging in Splunk Enterprise.
4. Click Save.

The Save button is disabled when the limit is reached and is enabled again when any custom field is deleted using the Delete action link.

Enable case-sensitive matching for asset fields

Case sensitive matching is now globally available across all fields.

Note that searches using | inputlookup ... where <filter> are case sensitive. Asset and Identity Management pages might use searches that contain where clauses. When case sensitivity is set to false, the merge process stores the values as lowercase so that case insensitive matches can be performed. To avoid this, you can toggle the case sensitive settings to true.

To use case-sensitive matching, do the following:

1. From the Splunk Enterprise Security menu bar, select Configure > Data Enrichment > Asset and Identity Management.
2. Click the Asset Settings tab.
3. Enable the Enable case sensitive asset matching switch.
4. Click **Update** to trigger the merge process and rewrite the
   asset_lookup_by_str and asset_lookup_by_cidr KV store collections.

**Create an Identity Lookup Configuration**

Identity lookup settings create the configuration that updates the inputs.conf file
to point to a lookup and update your identities. When new items are added, or
current items are updated, the change takes effect in 5 minutes.

**Add an identity input stanza for the lookup source**

To add a new identity input source, do the following:

1. From the Splunk ES menu bar, select **Configure > Data Enrichment >
   Asset and Identity Management**.
2. Click the **Identity Lookup Configuration** tab.
3. Click **New**.
4. In the New Identity Manager, do the following:
   1. Since you uploaded a CSV lookup file of identities during a
      prerequisite step, select the corresponding transforms.conf
      definition from the **Source** drop-down list.
   2. You can provide a name for the identity list stanza, but matching
      the source name is a good idea.
   3. Enter a descriptive category for this identity list, such as
      east_coast_employees or strategic_executives.
   4. Enter a detailed description of the contents of this identity list.
   5. Check the **Blacklist** check box to exclude the lookup file from
      bundle replication.
   6. In **Lookup List Type**, identity is selected for you.
   7. In **Lookup Field Exclusion List**, select fields for the merge
      process to ignore. This excludes the values from the KV store
      collections. This excludes the fields and those values from the KV
      store collections for that particular lookup. You might use this in the
      case where you have a field in your source file that you don’t want
      to rely on for information.

The asset and identity source lookup files are excluded from
bundle replication in an indexer cluster by default. The
merged lookup files are still included in bundle replication to
support asset and identity correlation. Changing the default
to include asset and identity lookup files in bundle replication
might reduce system performance. See Knowledge bundle
replication overview in the Splunk Enterprise Distributed
Search manual.

6. In **Lookup List Type**, identity is selected for you.
7. In **Lookup Field Exclusion List**, select fields for the merge
   process to ignore. This excludes the values from the KV store
   collections. This excludes the fields and those values from the KV
   store collections for that particular lookup. You might use this in the
   case where you have a field in your source file that you don’t want
   to rely on for information.
5. (Optional) Configure the conventions that the identity lookup can use to uniquely identify identities in your data. When an email convention check box is checked, the email address is used as an additional primary key for identity. The Email and Email Short conventions are enabled by default.
   1. Click Email to use the full email address.
   2. Click Email Short to use the email username.
   3. Click + Add a new convention to add a custom convention:
      You can identify users by the first few letters of their first name and the first few letters of their last name, based on the columns in the Identities Table. Use the convention of identity_first(n)middle(n)last(n) where identity, first, and last are any columns from the Identities Table, and where n is a number starting with 0. For example:
      ◊ "Jane Marie Johnson" using the convention first(3)last(3) is "janjoh"
      ◊ "John Michael Smith" using the convention first(1)middle(1).last() is "jm.smith"
      ◊ "John Doe" using the convention ADMIN_first(1)last() is "ADMIN_jdoe"
      ◊ Multiple matches are resolved automatically by taking the first match in the table or manually by specifying identity values.
   6. Click Save.

**Rank the order for merging identities**

Any new identity list gets added to the bottom of the page by default. You can rank the order of this list to determine priority for merging identities. If an identity exists in multiple source files as a single value, or exists multiple times in the same source file, this ranking is the weighted order for merging them. By default, the single value identity fields are as follows:

- endDate
- priority
- startDate
- watchlist

These are the fields where the rank takes effect. For example, if you're merging two identities, that both have the priority field value, you need to choose one to take precedence. The row at the top of the list takes precedence and the merge process uses that value, as opposed to the row that's ranked second.
To change the rank, do the following under the **Identity Lookup Configuration** tab:

1. Drag and drop the rows of the table into a new order.
2. When finished reordering, click **Save Ranking**.

Ranking is not considered for a multivalue field. The merge process combines all the values into the field, and then removes the duplicates.

**Identity Settings**

This is the list of identity fields that are added both by default and by entering custom fields manually. You can add up to 20 custom fields for your lookups. Key fields, such as *identity* are non-editable. However, for custom and default fields you are able to configure whether the field is a tag field, a **multivalue field**, or both.

**Add a new identity field**

To add a new custom identity field, do the following:

1. From the Splunk ES menu bar, select **Configure > Data Enrichment > Asset and Identity Management**.
2. Click the **Identity Settings** tab.
3. Click **Add New Field**.
4. In the New Identity Field window, do the following:
   1. Enter a lookup field name.
   2. Check the **Multivalue** check box if the field can output multiple values.
   3. Check the **Tag** check box if the field can be used as an identity tag. This is a helper field for holding additional values that you want to look up, in addition to the key fields. This is not the same as tagging in Splunk Enterprise.
4. Click **Save**.

The button is disabled when the limit is reached and enabled again when any custom field is deleted using the **Delete** action link.

**Enable case-sensitive matching for identity fields**

Case-sensitive matching is now globally available across all fields.
Note that searches using `| inputlookup ... where <filter>` are case sensitive. Asset and Identity Management pages might use searches that contain `where` clauses. When case sensitivity is set to false, the merge process stores the values as lowercase so the case insensitive matches can be performed. To avoid this, you can toggle the case sensitive settings to true.

To use case-sensitive matching, do the following:

1. From the Splunk Enterprise Security menu bar, select **Configure > Data Enrichment > Asset and Identity Management**.
2. Click the **Identity Settings** tab.
3. Enable the **Enable case sensitive identity matching** switch.
4. Click **Update** to trigger the merge process and rewrite the `identity_lookup_expanded` KV store collection.

**Enable Correlation Setup**

When asset and identity correlation is enabled, Splunk Enterprise Security compares indexed events with asset and identity data in the asset and identity lists to provide data enrichment and context. The comparison process uses automatic lookups in the props.conf file. You can find information about automatic lookups in the Splunk platform documentation:

- For Splunk Enterprise, see Make your lookup automatic in the Splunk Enterprise *Knowledge Manager Manual*.
- For Splunk Cloud, see Make your lookup automatic in the Splunk Cloud *Knowledge Manager Manual*.

Asset and identity correlation enriches events with asset and identity data at search time in the following ways:

- Asset correlation compares events that contain data in any of the `src`, `dest`, or `dvc` fields against the merged asset lists for matching IP address, MAC address, DNS name, or Windows NT host names. Asset correlation no longer occurs automatically against the `host` or `orig_host` fields.
- Identity correlation compares events that contain data in any of the `user` or `src_user` fields against the merged identity lists for a matching identity.
- Enterprise Security adds the matching output fields to the event. For example, correlation on the asset `src` field results in additional fields such as `src_is_expected` and `src_shouldtimesync`.

Asset and identity correlation lets you determine whether multiple events can relate to the same asset or identity. You can also perform actions on the identity
and asset fields added to events to open additional searches or dashboards scoped to the specific asset or identity. For example, you can open the Asset Investigator dashboard on a src field.

Choose whether to enable asset and identity correlation, disable it, or restrict correlation to occur only for select source types. If in doubt, keep asset and identity correlation enabled.

Disabling asset and identity correlation completely prevents events from being enriched with asset and identity data from the asset and identity lookups. This might prevent correlation searches, dashboards, and other functionality from working as expected. Consult with Splunk Professional Services or Splunk Support before disabling asset and identity correlation.

You can choose from the following options:

- Enable for all sourcetypes
- Disable for all sourcetypes
- Enable selectively by sourcetype

To enable or disable for all sourcetypes, do the following steps:

1. From the Splunk Enterprise Security menu bar, select Configure > Data Enrichment > Asset and Identity Management.  
2. Click the Correlation Setup tab.  
3. Do one of the following options:  
   - Click the Enable for all sourcetypes radio button.  
   - Click the Disable for all sourcetypes radio button.  
4. Click Save.

To enable selectively by sourcetype, do the following steps:

1. From the Splunk Enterprise Security menu bar, select Configure > Data Enrichment > Asset and Identity Management.  
2. Click the Correlation Setup tab.  
3. Click the Enable selectively by sourcetype radio button.  
4. Click + Add a new sourcetype.  
5. Enter the name of the sourcetype.  
6. Toggle Enable asset correlation or Enable identity correlation.  
7. Click Done.  
8. Click Save.
See Modify priority and rank in the Asset and Identity Framework in the *Use Splunk Enterprise Security* manual for further information about how ranks, correlations, and automatic lookups affect notable event urgency.

**Use the search preview to test the merge process**

You can test the asset and identity merge process if you want to confirm that the data produced by the merge process is expected and accurate. You can run the search previews to determine what the merge will do with your data without actually performing the merge. These steps aren't required, but can be performed to validate the merge works as expected.

If you used previous versions of ES, note that the search preview shows you the dynamic custom search that replaces the following correlation searches:

- Identity - Asset CIDR Matches - Lookup Gen
- Identity - Asset String Matches - Lookup Gen
- Identity - Identity Matches - Lookup Gen

To preview all your asset and identity searches, do the following:

1. From the ES menu bar, select **Configure > Data Enrichment > Asset and Identity Management**.
2. Click the **Search Preview** tab.
3. From each drop-down list, you can run the search preview for each collection, the lookups of which are located in the transforms.conf file:
   - asset_lookup_by_str is the lookup for the assets_by_str collection.
   - asset_lookup_by_cidr is the lookup for the assets_by_cidr collection.
   - identity_lookup_expanded is the lookup for the identities_expanded collection.

The search preview looks into all your lookup tables and creates custom-built searches with what is currently in your inputs.conf file. The search is dynamic and generates the search each time you refresh or load the page. If nothing has changed in the source files since the last merge, you do not see any output.

**Reset your collections**

All the asset and identity source files that are enabled in the Asset and Identity Management page get merged into the following default collections in the collections.conf file: assets_by_str, assets_by_cidr, or identities_expanded.
If your collections get into an undesirable state, you can reset your collections at any time, rather than waiting for the automated process to clear out the KV store collection. It's similar to clearing cache manually.

1. From the Splunk Enterprise Security menu bar, select **Configure > Data Enrichment > Asset and Identity Management**.
2. Click **Reset Collections**. The button is globally available regardless if you are configuring in a particular tab.

When the identity manager runs again in 5 minutes, it rebuilds the collections based on which source files are enabled in the Asset Lookup Configuration or the Identity Lookup Configuration.

**Modify asset and identity lookups**

Make changes to the asset and identity lookups in Splunk Enterprise Security to add new assets or identities, or change existing values in the lookup tables. You can also disable or enable existing lookups.

**Edit asset and identity lookups**

Edit an asset or identity lookup in the Identity Management dashboard.

1. In Enterprise Security, select **Configure > Data Enrichment > Asset and Identity Management**.
2. Find the name of the asset or identity list you want to edit, and select the corresponding lookup from the Source column. The list opens in an interactive editor.
3. Use the scroll bars to view the columns and rows in the table. Double click a cell to add, change, or remove content.
4. Click **Save** when you are finished.

**Manually add static asset or identity data**

Manually add new static asset or identity data to Splunk Enterprise Security by editing the Assets or Identities lookups. For example, add internal subnets, IP addresses to be whitelisted, and other static asset and identity data.

1. From the Splunk ES menu bar, select **Configure > Content > Content Management**.
2. To add asset data, click the **Assets** lookup to edit it. To add identity data, click the **Identities** list to edit it.
3. Use the scroll bars to view the columns and rows in the table. Double click in a cell to add, change, or remove content.
4. Save your changes.

Then you can see the lookup registered as static_assets or static_identities or in Configure > Data Enrichment > Asset and Identity Management.

**Disable the demo asset and identity lookups**

The demo asset and identity lookups are disabled by default. Enable them if needed for testing. Disable the demo asset and identity lookups to prevent the demo data from being added to the primary asset and identity lookups used by Splunk Enterprise Security for asset and identity correlation.

1. In Enterprise Security, select Configure > Data Enrichment > Asset and Identity Management.
2. Locate the demo_assets and demo_identities lookups.
3. Click Disable for each.

**Create a lookup from your current LDAP data in Splunk Enterprise Security**

Use LDAP to register your new assets or identities, create a lookup, and schedule a search to run on a regular basis.

**Prerequisites**

This requires the Splunk Supporting Add-on for Active Directory for access to the \ldapsearch command. See Collect and extract asset and identity data in Splunk Enterprise Security.

To get started with the Asset and Identity Builder, do the following:

1. From the ES menu bar, click Configure > Data Enrichment > Asset and Identity Management.
2. Select the Data Onboarding tab.
3. Click Create LDAP Configuration.

**Search**

In the search section, do the following to name the lookup generating search:
1. Select a type of data, such as **Asset**.
2. Provide a unique name for the search.
3. Provide your LDAP domain.

Once you have provided your LDAP domain, you will see messages in the custom search builder preview, such as "InvalidLDAPSearchSpec: Valid LDAP search specifications must supply a lookup." This message is normal at this point.

**Lookup**

In the lookup section, do the following:

1. Provide a lookup label for your search-driven lookup.
2. Provide a unique lookup name and/or transform name.
3. The lookup filename .csv will auto-complete based on the name you provided for the lookup name.

**Search schedule**

Once you have completed the lookup fields, the custom search builder preview will show the search it has created. Click **Run search** to verify if the search returns results.

In the search schedule section, do the following to run the search on a regular basis:

1. Enter a cron schedule.
2. Select **Real-time** or **Continuous** scheduling.
3. Click **Save**.

This saves two things:

- Saved searches that you can find in **Configure > Content > Content Management**
- Lookup table and lookup definition that you can find in **Settings > Lookups**

**Asset and identity management**

The next step is where you begin to create the settings stored in the **input.conf** file that points to the lookup and pulls the data every 5 minutes to make updates.
to the asset or identity collections.

Since this example is for an asset, the next window that pops up is the New Asset Manager.

1. The **Source** is auto-populated with the name of the lookup that you provided.
2. See [Asset Lookup Configuration](#).

For an identity, the steps are similar, but the next window that pops up is the New Identity Manager.

1. The **Source** is auto-populated with the name of the lookup that you provided.
2. See [Identity Lookup Configuration](#).

## Verify that your asset and identity data was added to Splunk Enterprise Security

Verify that your asset or identity data was added to Splunk Enterprise Security by searching and viewing dashboards.

### Prerequisites

2. Format the asset or identity list as a lookup in Splunk Enterprise Security.
3. Configure a new asset or identity list in Splunk Enterprise Security.

### Steps

Verify asset lookup data.

1. Verify that a specific asset record exists in the asset lookup.
   1. Choose an asset record with data in the `ip`, `mac`, `nt_host`, or `dns` fields from an asset list.
   2. Search for it in Splunk Web.

   ```
   | makeresults | eval src="1.2.3.4" | `get_asset(src)`
   ```
• View all available assets in your instance using one of the following methods. Compare the number of rows with your asset data sources to verify the number of asset records matches your expectations, or spot check specific records.

  • View the Asset Center dashboard. See Asset Center dashboard in *Use Splunk Enterprise Security*.
  • Use the assets macro.

        | `assets`
• Search the data model.

        | `datamodel("Identity_Management", "All_Assets")`
        | `drop_dm_object_name("All_Assets")`

Verify identity lookup data.

1. Verify that a specific identity record exists in the identity lookup.
   1. Choose an identity record with data in the *identity* field.
   2. Search for it in Splunk Web.

        | makeresults | eval user="VanHelsing" | `get_identity4events(user)`

• View all available identities in your instance using one of the following methods. Compare the number of rows with your identity data sources to verify the number of identity records matches your expectations, or spot check specific records.

  • View the Identity Center dashboard. See Identity Center dashboard in *Use Splunk Enterprise Security*.
  • Use the identities macro.

        | `identities`
• Search the data model.

        | `datamodel("Identity_Management", "All_Identities")`
        | `drop_dm_object_name("All_Identities")`

**How Splunk Enterprise Security processes and merges asset and identity data**

Splunk Enterprise Security takes the asset and identity data that you add as lookups and generates combined lookup files. Splunk Enterprise Security uses
the generated lookup files to correlate asset and identity data with events using automatic lookups. The following steps describe this process at a high level.

1. You collect asset and identity data from data sources using an add-on and a custom search or manually with a CSV file. See Collect and extract asset and identity data.
3. You format the data as a lookup, using a search or manually with a CSV file. See Format the asset or identity list as a lookup.
4. You configure the list as a lookup table, definition, and input. See Configure a new asset or identity list.
5. You create an identity lookup configuration. See Create an identity lookup configuration.
6. The Splunk Enterprise Security identity manager modular input detects two things:
   ♦ Changed size of the CSV source file.
   ♦ Changed update time of the CSV source file.
7. The Splunk Enterprise Security identity manager modular input updates the macros used to identify the input sources based on the currently enabled stanzas in inputs.conf.
8. The Splunk Enterprise Security identity manager modular input dispatches custom dynamic searches if it identifies changes that require the asset and identity lists to be merged.
9. The custom search dispatches a merge process to merge all configured and enabled asset and identity lists.
10. The custom searches concatenate the lookup tables referenced by the identity manager input, generate new fields, and output the concatenated asset and identity lists into target lookup table files: asset_lookup_by_str, asset_lookup_by_cidr, identity_lookup_expanded.
11. You verify that the data looks as expected. See Verify that your asset or identity data was added to Splunk Enterprise Security.

The merging of identity and asset lookups does not validate or de-duplicate input. Errors from the identity manager modular input are logged in identity_manager.log. This log does not show data errors.

Lookups that store merged asset and identity data in Splunk Enterprise Security
After the asset and identity merging process completes, four lookups store your asset and identity data.

**Current**

<table>
<thead>
<tr>
<th>Function</th>
<th>Table name</th>
<th>Lookup name</th>
</tr>
</thead>
<tbody>
<tr>
<td>String-based asset correlation</td>
<td>assets_by_str KV store collection</td>
<td>LOOKUP-zu-asset_lookup_by_str-dest, LOOKUP-zu-asset_lookup_by_str-dvc, LOOKUP-zu-asset_lookup_by_str-src</td>
</tr>
<tr>
<td>CIDR subnet-based asset correlation</td>
<td>assets_by_cidr KV store collection</td>
<td>LOOKUP-zv-asset_lookup_by_cidr-dest, LOOKUP-zv-asset_lookup_by_cidr-dvc, LOOKUP-zv-asset_lookup_by_cidr-src</td>
</tr>
<tr>
<td>String-based identity correlation</td>
<td>identities_expanded KV store collection</td>
<td>LOOKUP-zy-identity_lookup_expanded-src_user, LOOKUP-zy-identity_lookup_expanded-user</td>
</tr>
</tbody>
</table>

The main difference now is that three out of four tables are migrated from .csv files to KV store, and can store custom fields. The default field correlation is not migrated over to KV store at this time. The automatic lookups still remain in props.conf.

**5.3.1 and earlier**

<table>
<thead>
<tr>
<th>Function</th>
<th>Table name</th>
<th>Saved search</th>
<th>Lookup name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIDR subnet-based asset</td>
<td>assets_by_cidr.csv</td>
<td>Identity - Asset CIDR</td>
<td>LOOKUP-zv-asset_lookup_by_cidr-dest, LOOKUP-zv-asset_lookup_by_cidr-dvc, LOOKUP-zv-asset_lookup_by_cidr-src</td>
</tr>
<tr>
<td>Function</td>
<td>Table name</td>
<td>Saved search</td>
<td>Lookup name</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>correlation</td>
<td></td>
<td>Matches - Lookup Gen</td>
<td>LOOKUP-zy-identity_lookup_expanded</td>
</tr>
<tr>
<td>String-based identity</td>
<td>identities_expanded.csv</td>
<td>Identity - Identity Matches - Lookup Gen</td>
<td>LOOKUP-zy-identity_lookup_expanded</td>
</tr>
<tr>
<td>correlation</td>
<td>identity_lookup_default_fields.csv</td>
<td>asset_lookup_default_fields.csv</td>
<td>LOOKUP-zz-asset_identity_lookup_default_fields-dest</td>
</tr>
<tr>
<td>Default field correlation</td>
<td></td>
<td></td>
<td>LOOKUP-zz-asset_identity_lookup_default_fields-dvc</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LOOKUP-zz-asset_identity_lookup_default_fields-src</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LOOKUP-zz-asset_identity_lookup_default_fields-src_user</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LOOKUP-zz-asset_identity_lookup_default_fields-user</td>
</tr>
</tbody>
</table>

**Asset and identity fields after processing in Splunk Enterprise Security**

The following tables describe the fields that exist in the asset and identity lookups after Splunk Enterprise Security finishes processing the source lookup files. These fields are the fields present in the lookups that store merged asset and identity data. See Lookups that store merged asset and identity data in Splunk Enterprise Security.

The tables below list the default asset and identity fields in the KV store collections after the merge process completes. However, take note that it is possible to revise fields from multivalue to single, and tag or untag fields. It is also possible to add custom fields.

**Asset fields after processing**

Asset fields of the asset lookup after the saved searches perform the merge process.

<table>
<thead>
<tr>
<th>Field</th>
<th>Action taken by ETL</th>
</tr>
</thead>
<tbody>
<tr>
<td>bunit</td>
<td>unchanged</td>
</tr>
<tr>
<td>city</td>
<td>unchanged</td>
</tr>
<tr>
<td>country</td>
<td>unchanged</td>
</tr>
<tr>
<td>Field</td>
<td>Action taken by ETL</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>dns</td>
<td>Accepts all values and converts them to a multi-value field.</td>
</tr>
<tr>
<td>lat</td>
<td>unchanged</td>
</tr>
<tr>
<td>long</td>
<td>unchanged</td>
</tr>
<tr>
<td>mac</td>
<td>Accepts all values and converts them to a multi-value field.</td>
</tr>
<tr>
<td>nt_host</td>
<td>Accepts all values and converts them to a multi-value field.</td>
</tr>
<tr>
<td>owner</td>
<td>unchanged</td>
</tr>
<tr>
<td>priority</td>
<td>unchanged</td>
</tr>
<tr>
<td>asset_id</td>
<td>Generated from the values of dns, ip, mac, and nt_host fields.</td>
</tr>
<tr>
<td>asset_tag</td>
<td>By default, generated from the values of category, pci_domain, is_expected, should_timesync, should_update, requires_av, and bunit fields. Also custom generated from assets that have been tagged. See Asset Settings.</td>
</tr>
<tr>
<td>category</td>
<td>Appends &quot;pci&quot; if the value contains &quot;cardholder&quot;. Accepts all values and converts them to a multi-value field.</td>
</tr>
<tr>
<td>ip</td>
<td>Validates and splits the field into CIDR subnets as necessary. Accepts all values and converts them to a multi-value field.</td>
</tr>
<tr>
<td>pci_domain</td>
<td>Appends &quot;trust&quot; or &quot;untrust&quot; based on certain field values. Accepts all values and converts them to a multi-value field.</td>
</tr>
<tr>
<td>is_expected</td>
<td>Normalized to a boolean.</td>
</tr>
<tr>
<td>should_timesync</td>
<td>Normalized to a boolean.</td>
</tr>
<tr>
<td>should_update</td>
<td>Normalized to a boolean.</td>
</tr>
<tr>
<td>requires_av</td>
<td>Normalized to a boolean.</td>
</tr>
<tr>
<td>key</td>
<td>Generated by the ip, mac, nt_host, and dns fields after the original fields are transformed.</td>
</tr>
</tbody>
</table>

**Identity fields after processing**

Identity fields of the identity lookup after the saved searches perform the merge process.

<table>
<thead>
<tr>
<th>Field</th>
<th>Action taken by ETL</th>
</tr>
</thead>
<tbody>
<tr>
<td>bunit</td>
<td>unchanged</td>
</tr>
<tr>
<td>email</td>
<td>unchanged</td>
</tr>
<tr>
<td>endDate</td>
<td>unchanged</td>
</tr>
<tr>
<td>Field</td>
<td>Action taken by ETL</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>first</td>
<td>unchanged</td>
</tr>
<tr>
<td>last</td>
<td>unchanged</td>
</tr>
<tr>
<td>managedBy</td>
<td>unchanged</td>
</tr>
<tr>
<td>nick</td>
<td>unchanged</td>
</tr>
<tr>
<td>phone</td>
<td>unchanged, multivalue</td>
</tr>
<tr>
<td>prefix</td>
<td>unchanged</td>
</tr>
<tr>
<td>priority</td>
<td>unchanged</td>
</tr>
<tr>
<td>startDate</td>
<td>unchanged</td>
</tr>
<tr>
<td>suffix</td>
<td>unchanged</td>
</tr>
<tr>
<td>work_city</td>
<td>unchanged</td>
</tr>
<tr>
<td>work_country</td>
<td>unchanged</td>
</tr>
<tr>
<td>work_lat</td>
<td>unchanged</td>
</tr>
<tr>
<td>work_long</td>
<td>unchanged</td>
</tr>
<tr>
<td>watchlist</td>
<td>Normalized to a boolean.</td>
</tr>
<tr>
<td>category</td>
<td>Appends &quot;pci&quot; if the value contains &quot;cardholder&quot;. Accepts all values and converts them to a multi-value field.</td>
</tr>
<tr>
<td>identity</td>
<td>Generated based on values in the input row and conventions specified in the Identity Lookup Configuration. Accepts all values and converts them to a multi-value field.</td>
</tr>
<tr>
<td>identity_id</td>
<td>Generated from the values of identity, first, last, and email.</td>
</tr>
<tr>
<td>identity_tag</td>
<td>By default, generated from the values of bunit, category, and watchlist. Also custom generated from assets that have been tagged. See Identity Settings.</td>
</tr>
</tbody>
</table>
Threat Intelligence

Add threat intelligence to Splunk Enterprise Security

As an ES administrator, you can correlate indicators of suspicious activity, known threats, or potential threats with your events by adding threat intelligence to Splunk Enterprise Security. Adding threat intelligence enhances your analysts’ security monitoring capabilities and adds context to their investigations.

Splunk Enterprise Security includes a selection of threat intelligence sources. Splunk Enterprise Security also supports multiple types of threat intelligence so that you can add your own threat intelligence.

ES administrators can add threat intelligence to Splunk Enterprise Security by downloading a feed from the Internet, uploading a structured file, or inserting the threat intelligence directly from events in Splunk Enterprise Security.

Prerequisite


Steps

1. Configure the threat intelligence sources included with Splunk Enterprise Security.
2. For each additional threat intelligence source not already included with Splunk Enterprise Security, follow the procedure to add threat intelligence that matches the source and format of the intelligence that you want to add.
   - Download a threat intelligence feed from the Internet
   - Upload a STIX or OpenIOC structured threat intelligence file
   - Upload a custom CSV file of threat intelligence
   - Add threat intelligence from Splunk events in Splunk Enterprise Security
   - Add and maintain threat intelligence locally in Splunk Enterprise Security
   - Add threat intelligence with a custom lookup file in Splunk Enterprise Security
3. Verify that you have added threat intelligence successfully in Splunk Enterprise Security.

See also

Change existing threat intelligence in Splunk Enterprise Security

Add threat intelligence with an adaptive response action.

Threat Intelligence API reference in REST API Reference.
Threat Intelligence framework in Splunk ES on the Splunk developer portal

**Supported types of threat intelligence in Splunk Enterprise Security**

Splunk Enterprise Security supports several types of threat intelligence. The supported types of threat intelligence correspond to the KV Store collections in which the threat intelligence is stored.

The threat intelligence manager modular input parses downloaded and uploaded files and adds indicators to these collections. Files can contain any combination of indicators.

<table>
<thead>
<tr>
<th>Threat collection in KV Store</th>
<th>Supported IOC data types</th>
<th>Local lookup file</th>
</tr>
</thead>
<tbody>
<tr>
<td>certificate_intel</td>
<td>X509 Certificates</td>
<td>certificate_issuer,certificate_subject,certificate_serial,certificate_issuer_unit,certificate_subject_unit,description,weight</td>
</tr>
<tr>
<td>email_intel</td>
<td>Email</td>
<td>description,src_user,subject,weight</td>
</tr>
<tr>
<td>file_intel</td>
<td>File names or hashes</td>
<td>description,file_hash,file_name,weight</td>
</tr>
<tr>
<td>http_intel</td>
<td>URLs</td>
<td>description,http_referrer,http_user_agent,url,weight</td>
</tr>
<tr>
<td>ip_intel</td>
<td>IP addresses</td>
<td>description,ip,weight</td>
</tr>
<tr>
<td>Threat collection in KV Store</td>
<td>Supported IOC data types</td>
<td>Local lookup file</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>domains</td>
<td>Local Domain Intel</td>
<td>description, domain, weight</td>
</tr>
<tr>
<td>process_intel</td>
<td>Local Process Intel</td>
<td>description, process, process_file_name, weight</td>
</tr>
<tr>
<td>registry_intel</td>
<td>Local Registry Intel</td>
<td>description, registry_path, registry_value_name, registry_value_text, weight</td>
</tr>
<tr>
<td>service_intel</td>
<td>Local Service Intel</td>
<td>description, service, service_file_hash, service_dll_file_hash, weight</td>
</tr>
<tr>
<td>user_intel</td>
<td>Local User Intel</td>
<td>description, user, weight</td>
</tr>
</tbody>
</table>

The collections.conf file in the DA-ESS-ThreatIntelligence subdirectory lists these KV Store collections.

**Configure the intelligence sources included with Splunk Enterprise Security**

Splunk Enterprise Security includes several intelligence sources that retrieve information across the Internet.

None of these intelligence sources are enabled by default. Review the types of intelligence provided by the sources, and determine if the included intelligence is useful to your team before enabling specific sources.

**Prerequisites**

- Your Splunk Enterprise deployment must be connected to the Internet. If your deployment is not connected to the Internet, disable these sources or source them in an alternate way.
- To set up firewall rules for these sources, you might want to use a proxy server to collect the intelligence before forwarding it to Splunk Enterprise Security and allow the IP address for the proxy server to access Splunk.
Enterprise Security. The IP addresses for these sources can change.

Steps

1. From the Enterprise Security menu bar, select **Configure > Data Enrichment > Intelligence Downloads**.
2. Review the **Description** field for all defined intelligence sources to learn more about the types of information or threat indicators that can be correlated with your events.
3. Enable the intelligence sources that fit your security use cases.
4. Configure the enabled intelligence sources that fit your security use cases, using the links to the source websites to review the source provider’s documentation. Each source website provides suggestions for polling intervals and other configuration requirements separate from Splunk Enterprise Security.

Splunk Enterprise Security expects all intelligence sources to send properly-formatted data and valuable intelligence information. Feed providers are responsible for malformed data or false positives that might be identified in your environment as a result.

If you determine that your Splunk Enterprise Security installation is retrieving data from unexpected IP addresses, perform a WHOIS or nslookup to determine if the IP address matches that of one of the intelligence sources configured in your environment.

Next step

To add a custom threat source, see **Add threat intelligence to Splunk Enterprise Security** and follow the link that matches the source that you want to add.

If you are finished adding intelligence sources, see **Verify that you have added intelligence successfully in Splunk Enterprise Security**.

Included threat intelligence sources

The threat intelligence sources are parsed for threat indicators and added to the relevant KV Store collections.

<table>
<thead>
<tr>
<th>Threat source</th>
<th>Threat list</th>
<th>Website for the threat source</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td></td>
<td></td>
</tr>
<tr>
<td>provider</td>
<td>Website for data provider</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------</td>
<td></td>
</tr>
<tr>
<td>Emerging Threats compromised IPs blocklist</td>
<td>Emerging Threats <a href="https://rules.emergingthreats.net/blockrules">https://rules.emergingthreats.net/blockrules</a></td>
<td></td>
</tr>
<tr>
<td>Emerging Threats firewall IP rules</td>
<td>Emerging Threats <a href="https://rules.emergingthreats.net/fwrules">https://rules.emergingthreats.net/fwrules</a></td>
<td></td>
</tr>
<tr>
<td>Malware domain host list</td>
<td>Hail a TAXII.com <a href="http://hailataxii.com">http://hailataxii.com</a></td>
<td></td>
</tr>
<tr>
<td>iblocklist Logmein</td>
<td>I-Blocklist <a href="https://www.iblocklist.com/lists">https://www.iblocklist.com/lists</a></td>
<td></td>
</tr>
<tr>
<td>iblocklist Piratebay</td>
<td>I-Blocklist <a href="https://www.iblocklist.com/lists">https://www.iblocklist.com/lists</a></td>
<td></td>
</tr>
<tr>
<td>iblocklist Proxy</td>
<td>I-Blocklist <a href="https://www.iblocklist.com/lists">https://www.iblocklist.com/lists</a></td>
<td></td>
</tr>
<tr>
<td>iblocklist Rapidshare</td>
<td>I-Blocklist <a href="https://www.iblocklist.com/lists">https://www.iblocklist.com/lists</a></td>
<td></td>
</tr>
<tr>
<td>iblocklist Spyware</td>
<td>I-Blocklist <a href="https://www.iblocklist.com/lists">https://www.iblocklist.com/lists</a></td>
<td></td>
</tr>
<tr>
<td>iblocklist Tor</td>
<td>I-Blocklist <a href="https://www.iblocklist.com/lists">https://www.iblocklist.com/lists</a></td>
<td></td>
</tr>
<tr>
<td>iblocklist Web attacker</td>
<td>I-Blocklist <a href="https://www.iblocklist.com/lists">https://www.iblocklist.com/lists</a></td>
<td></td>
</tr>
<tr>
<td>Malware Domain Blocklist</td>
<td>Malware Domains <a href="https://mirror1.malwaredomains.com">https://mirror1.malwaredomains.com</a></td>
<td></td>
</tr>
<tr>
<td>abuse.ch Palevo C&amp;C IP Blocklist</td>
<td>abuse.ch <a href="https://palevotracker.abuse.ch">https://palevotracker.abuse.ch</a></td>
<td></td>
</tr>
<tr>
<td>Phishtank Database</td>
<td>Phishtank <a href="https://www.phishtank.com/">https://www.phishtank.com/</a></td>
<td></td>
</tr>
<tr>
<td>SANS blocklist</td>
<td>SANS <a href="https://isc.sans.edu">https://isc.sans.edu</a></td>
<td></td>
</tr>
<tr>
<td>abuse.ch ZeuS blocklist (bad IPs only)</td>
<td>abuse.ch <a href="https://zeustracker.abuse.ch">https://zeustracker.abuse.ch</a></td>
<td></td>
</tr>
<tr>
<td>abuse.ch ZeuS blocklist (standard)</td>
<td>abuse.ch <a href="https://zeustracker.abuse.ch">https://zeustracker.abuse.ch</a></td>
<td></td>
</tr>
</tbody>
</table>

### Included generic intelligence sources

Splunk Enterprise Security also includes generic intelligence that is not added to the threat intelligence KV Store collections and are instead used to enrich data in Splunk Enterprise Security.
<table>
<thead>
<tr>
<th>Source</th>
<th>Provider</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco Umbrella 1 Million Sites</td>
<td>Cisco</td>
<td><a href="https://umbrella.cisco.com/blog/2016/12/14/cisco-umbrella-1-million/">https://umbrella.cisco.com/blog/2016/12/14/cisco-umbrella-1-million/</a></td>
</tr>
<tr>
<td>Alexa Top 1 Million Sites</td>
<td>Alexa</td>
<td><a href="https://s3.amazonaws.com/alexa-static">https://s3.amazonaws.com/alexa-static</a></td>
</tr>
<tr>
<td>ICANN Top-level Domains List</td>
<td>IANA</td>
<td><a href="https://data.iana.org/TLD/">https://data.iana.org/TLD/</a></td>
</tr>
<tr>
<td>Mozilla Public Suffix List</td>
<td>Mozilla</td>
<td><a href="https://publicsuffix.org">https://publicsuffix.org</a></td>
</tr>
</tbody>
</table>

You can configure the generic intelligence source to use for top one million sites:

1. From the Splunk ES menu bar, select **Configure > General > General Settings**
2. Scroll down to Top 1M Site Source and select **Cisco**.

### Download a threat intelligence feed from the Internet in Splunk Enterprise Security

Splunk Enterprise Security can periodically download a threat intelligence feed available from the Internet, parse it, and add it to the relevant KV Store collections.

1. (Optional) **Configure a proxy for retrieving threat intelligence.**
2. Follow the procedure that matches the format of the threat source:
If you manually disable a threat artifact in a collection, but the threat intelligence source provides the same indicator in a download again, then the entry in KVStore gets overwritten, and does not preserve your flag.

**Configure a proxy for retrieving threat intelligence**

If you use a proxy server to send threat intelligence to Splunk Enterprise Security, configure the proxy options for the threat source.

The user must correspond to the name of a Splunk secure stored credential in Credential Management. If you remove an existing proxy user and password in the Intelligence Download Setting editor, the download process no longer references the stored credentials. Removing the reference to the credential does not delete the stored credentials from Credential Management. See Manage credentials in Splunk Enterprise Security.

1. On the Enterprise Security menu bar, select Configure > Data Enrichment > Intelligence Downloads.
2. Select the threat download source or add a new threat download source. See Add a URL-based threat source or Add a TAXII feed.
3. Configure the proxy options.
   1. Type a proxy server address. The **Proxy Server** cannot be a URL. For example, 10.10.10.10 or server.example.com.
   2. Type a proxy server port to use to access the proxy server address.
   3. Type a proxy user credential for the proxy server. Only basic and digest authentication methods are supported. The user must correspond to the name of a credential stored in Credential Management.
   4. (Optional) Type a proxy user realm for the proxy user credential. Use this to specify a proxy user realm for the user credential.
4. Save your changes.

**Add a URL-based threat source**

Add a non-TAXII source of intelligence that is available from a URL on the Internet. For an example of adding a URL-based threat intelligence source, see Example: Add a ransomware threat feed to Splunk Enterprise Security.

1. On the Enterprise Security menu bar, select Configure > Data Enrichment > Intelligence Downloads.
2. Click **New** to add a new intelligence source.

3. Type a **Name** for the threat download. The name can only contain alphanumeric characters, hyphens, and underscores. The name cannot contain spaces.

4. Select or deselect the check box for **Is Threat Intelligence**.

5. (Optional) Select or deselect the check box for **Sinkhole**. Select the check box to delete the downloaded file after processing.

6. Type a **Type** for the threat download. The type identifies the type of threat indicator that the feed contains.

7. Type a **Description**. Describe the indicators in the threat feed.

8. Type an integer to use as the **Weight** for the threat indicators. Enterprise Security uses the weight of a threat feed to calculate the risk score of an asset or identity associated with an indicator on the threat feed. A higher weight indicates an increased relevance or an increased risk to your environment.

9. (Optional) Change the default download **Interval** for the threat feed. Defaults to 43200 seconds, or every 12 hours.

10. (Optional) Type POST arguments for the threat feed. You can use POST arguments to retrieve user credentials from Credential Management. Use the format `key=$user:<username>$` or `key=$user:<username>,realm:<realm>$` to specify a username and realm.

11. (Optional) Type a **Maximum age** to define the retention period for this threat source, defined in relative time. Enable the corresponding saved searches for this setting to take effect. See Configure threat source retention.

   For example, `-7d`. If the time that the feed was last updated is greater than the maximum age defined with this setting, the threat intelligence modular input removes the data from the threat collection.

12. (Optional) If you need to specify a custom **User agent** string to bypass network security controls in your environment, type it in the format `<user-agent>/<version>`. For example, Mozilla/5.0 or AppleWebKit/602.3.12. The value in this field must match this regex: `([A-Za-z0-9_.-]+)/([A-Za-z0-9_.-]+)`. Check with your security device administrator to ensure the string you type here is accepted by your network security controls.

13. Fill out the **Parsing Options** fields to make sure that your threat list parses successfully. You must fill out either a delimiting regular expression or an extracting regular expression. You cannot leave both fields blank.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delimiting regular expression</td>
<td>A regular expression string used to split, or delimit, lines in an intelligence source. For complex delimiters, use an extracting regular expression.</td>
<td><code>, or : or \t</code></td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Extracting regular expression</td>
<td>A regular expression used to extract fields from individual lines of a threat source document. Use to extract values in the threat source.</td>
<td><code>^\S+\t+\S+\t+\S+\t+\S+\t*(\S*)</code></td>
</tr>
<tr>
<td>Fields</td>
<td>Required if your document is line-delimited. Comma-separated list of fields to be extracted from the threat list. Can also be used to rename or combine fields. Description is a required field. Additional acceptable fields are the fields in the corresponding KV Store collection for the threat intelligence, visible in the local lookup files or the DA-ESS-ThreatIntelligence/collections.conf file. Defaults to <code>description:$1,ip:$2</code>.</td>
<td><code>&lt;fieldname&gt;:$&lt;number&gt;,&lt;fieldname&gt;.$&lt;number&gt;,ip:$1,description:domain_blocklist</code></td>
</tr>
<tr>
<td>Ignoring regular expression</td>
<td>A regular expression used to ignore lines in a threat source. Defaults to ignoring blank lines and comments beginning with <code>#</code>.</td>
<td><code>^\s*$</code></td>
</tr>
<tr>
<td>Skip header lines</td>
<td>The number of header lines to skip when processing the threat source.</td>
<td>0</td>
</tr>
<tr>
<td>Intelligence file encoding</td>
<td>If the file encoding is something other than ASCII or UTF8, specify the encoding here. Leave blank otherwise.</td>
<td><code>latin1</code></td>
</tr>
</tbody>
</table>

14. (Optional) Change the **Download Options** fields to make sure that your threat list downloads successfully.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retry interval</td>
<td>Number of seconds to wait between download retry attempts. Review the recommended poll interval of the threat source provider before changing the retry interval.</td>
<td>60</td>
</tr>
<tr>
<td>Remote site user</td>
<td>If the threat feed requires authentication, type the user name to use in remote authentication, if required. The user name you add in this field must match the name of a credential in Credential Management. See Manage input credentials in Splunk Enterprise Security.</td>
<td><code>buttercup</code></td>
</tr>
<tr>
<td>Remote</td>
<td>If the threat feed requires authentication, type the</td>
<td><code>paddock</code></td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>site user realm</td>
<td>user name to use in remote authentication, if required. The realm you add in this field must match the realm of a credential in Credential Management. See Manage input credentials in Splunk Enterprise Security.</td>
<td></td>
</tr>
<tr>
<td>Retries</td>
<td>The maximum number of retry attempts.</td>
<td>3</td>
</tr>
<tr>
<td>Timeout</td>
<td>Number of seconds to wait before marking a download attempt as failed.</td>
<td>30</td>
</tr>
</tbody>
</table>

15. (Optional) If you are using a proxy server, fill out the **Proxy Options** for the threat feed. See Configure a proxy for retrieving threat intelligence.

16. Save your changes.

**Next step**

To add another custom threat source, see Add threat intelligence to Splunk Enterprise Security and follow the link that matches the source that you want to add.

If you are finished adding threat intelligence sources, see Verify that you have added threat intelligence successfully in Splunk Enterprise Security.

**Add a TAXII feed**

Add threat intelligence provided as a TAXII feed to Splunk Enterprise Security.

**Prerequisite**

Determine whether the TAXII feed requires certificate authentication. If it does, add the certificate and keys to the same app directory in which you define the TAXII feed. For example, DA-ESS-ThreatIntelligence.

1. Follow the steps to add a new certificate to Splunk Enterprise Security to add both the certificate and the private key files. See Manage credentials in Splunk Enterprise Security.

2. Follow the steps for adding a TAXII feed to Splunk Enterprise Security, using the `cert_file` and `key_file` POST arguments to specify the file names of the certificate and private key file.

**Steps**
1. On the Enterprise Security menu bar, select **Configure > Data Enrichment > Intelligence Downloads**.

2. Click **New** to add a new TAXII feed.

3. Type a **Name** for the threat intelligence feed.

4. Select the check box for **Is Threat Intelligence**.

5. (Optional) Select or deselect the check box for **Sinkhole**. Select the check box to delete the downloaded file after processing. The sinkhole option works for anything in the pickup directory that has been processed. The pickup directories follow:
   - `$SPLUNK_HOME/etc/apps/SA-ThreatIntelligence/local/data/threat_intel`
   - `$SPLUNK_HOME/etc/apps/DA-ESS-ThreatIntelligence/default/data/threat_intel`
   - `$SPLUNK_HOME/etc/apps/DA-ESS-ThreatIntelligence/local/data/threat_intel`
   - `$SPLUNK_HOME/etc/apps/<custom>`

6. Type a **Type** of taxii.

7. Type a **Description** for the threat intelligence feed.

8. Type a URL to use to download the TAXII feed.

9. (Optional) Change the default **Weight** for the threat intelligence feed. Increase the weight if the threats on the threat feed are high-confidence and malicious threats that should increase the risk score for assets and identities that interact with the indicators from the threat source.

10. (Optional) Adjust the interval at which to download the threat intelligence. Defaults to 43200 seconds, or twice a day.

11. Type TAXII-specific space-delimited **POST arguments** for the threat intelligence feed.

   `<POST argument>="<POST argument value>"`

<table>
<thead>
<tr>
<th>Example POST argument</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>collection</td>
<td>Name of the data collection from a TAXII feed.</td>
<td><code>collection=&quot;A_TAXII_Feed_Name&quot;</code></td>
</tr>
<tr>
<td>earliest</td>
<td>The earliest threat data to pull from the TAXII feed.</td>
<td><code>earliest=&quot;-1y&quot;</code></td>
</tr>
<tr>
<td>taxii_username</td>
<td>An optional method to provide a TAXII feed username.</td>
<td><code>taxii_username=&quot;user&quot;</code></td>
</tr>
<tr>
<td>taxii_password</td>
<td>An optional method to provide a TAXII feed username.</td>
<td><code>taxii_password=&quot;password&quot;</code></td>
</tr>
<tr>
<td>Example POST argument</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>feed password. If you provide a username without providing a password, the threat intelligence modular input attempts to find the password in Credential Management. See Manage credentials in Splunk Enterprise Security.</td>
<td></td>
</tr>
<tr>
<td>taxii_username_realm</td>
<td>An optional method to provide a realm for the TAXII feed username. Used with the <code>taxii_username</code> to locate the user credential password in Credential Management.</td>
<td><code>taxii_username_realm=&quot;realm&quot;</code></td>
</tr>
<tr>
<td>cert_file</td>
<td>Add the certificate file name if the TAXII feed uses certificate authentication. The file name must match exactly and is</td>
<td><code>cert_file=&quot;cert.crt&quot;</code></td>
</tr>
<tr>
<td>Example POST argument</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>key_file</td>
<td>Add the key file name for the certificate if the TAXII feed uses certificate authentication. The file name must match exactly and is case sensitive.</td>
<td>key_file=&quot;cert.key&quot;</td>
</tr>
</tbody>
</table>

12. TAXII feeds do not use the **Maximum age** setting. To configure file retention for TAXII files, see Configure intelligence file retention.
13. TAXII feeds do not use the **User agent** setting.
14. TAXII feeds do not use the **Parsing Options** settings.
15. (Optional) Change the **Download Options**.
16. (Optional) Change the **Proxy Options**. See Configure a proxy for retrieving threat intelligence.
17. Save the changes.

You cannot use an authenticated proxy with a TAXII feed because the libtaxii library used by Enterprise Security does not support authenticated proxies. If possible, use an unauthenticated proxy instead.

**Next step**

To add another custom threat source, see Add threat intelligence to Splunk Enterprise Security and follow the link that matches the source that you want to add.

If you are finished adding threat intelligence sources, see Verify that you have added threat intelligence successfully in Splunk Enterprise Security.

**Upload a STIX or OpenIOC structured threat intelligence file in Splunk Enterprise Security**

Upload threat intelligence in a STIX or OpenIOC file to Splunk Enterprise Security using one of the following methods:


- Upload a STIX or OpenIOC file using the Splunk Enterprise Security interface
- Add STIX or OpenIOC files using the REST API
- Add STIX or OpenIOC files using the file system

**Upload a STIX or OpenIOC file using the Splunk Enterprise Security interface**

Splunk Enterprise Security supports adding OpenIOC, STIX, and CSV file types directly in the Splunk Enterprise Security interface.

1. On the Enterprise Security menu bar, select **Configure > Data Enrichment > Threat Intelligence Uploads**.
2. Type a file name for the file you want to upload. The file name you type becomes the name of the file saved to
   \$SPLUNK_HOME/etc/apps/DA-ESS-ThreatIntelligence/local/data/threat_intel.
   The file name cannot include spaces or special characters.
3. Upload an OpenIOC or STIX-formatted file.
4. Type a **Weight** for the threat intelligence file. The weight of a threat intelligence file increases the risk score of objects associated with threat intelligence on this list.
5. (Optional) Type a **Threat Category**. If you leave this field blank and a category is specified in the OpenIOC or STIX file, Splunk Enterprise Security uses the threat category specified in the file.
6. (Optional) Type a **Threat Group**. If you leave this field blank and a group is specified in the OpenIOC or STIX file, Splunk Enterprise Security uses the threat group specified in the file.
7. (Optional) Select the **Overwrite** check box. If you have previously uploaded a file with the same file name, select this check box to overwrite the previous version of the file.
8. (Optional) Select the **Sinkhole** check box. This deletes the file after the intelligence from the file is processed.
9. Click **Save**.

**Next step**

To add another custom threat source, see Add threat intelligence to Splunk Enterprise Security and follow the link that matches the source that you want to add.

If you are finished adding threat intelligence sources, see Verify that you have added threat intelligence successfully in Splunk Enterprise Security.
Add STIX or OpenIOC files using the REST API

The Splunk Enterprise Security REST API supports uploading threat intelligence files in OpenIOC, STIX, or CSV format. See Threat Intelligence API reference.

Next step

To add another custom threat source, see Add threat intelligence to Splunk Enterprise Security and follow the link that matches the source that you want to add.

If you are finished adding threat intelligence sources, see Verify that you have added threat intelligence successfully in Splunk Enterprise Security.

Add STIX or OpenIOC files using the file system

You can also add threat intelligence to Splunk Enterprise Security by adding a properly-formatted file to a file system folder.

1. Add a STIX-formatted file with a .xml file extension or an OpenIOC file with a .ioc file extension to the
   $SPLUNK_HOME/etc/apps/DA-ESS-ThreatIntelligence/local/data/threat_intel
   folder on your Splunk Enterprise Security search head or make it available to that file directory on a mounted local network share.
2. By default, the da_ess_threat_local modular input processes those files and places the threat intelligence found in the relevant KV Store collections.
3. By default, after processing the intelligence in the files, the modular input deletes the files because the sinkhole setting is enabled by default.

Change the da_ess_threat_local inputs settings

1. On the Enterprise Security menu bar, select Configure > Data Enrichment > Threat Intelligence Management.
2. Click the da_ess_threat_local modular input.
3. Review or change the settings as required.

Do not change the default da_ess_threat_default input.

Configure a custom folder and input monitor for threat sources

You can also add threat intelligence to Splunk Enterprise Security by adding a properly-formatted file to a custom file directory. The file directory must match the
pattern $SPLUNK_HOME/etc/apps/<app_name>/local/data/<directory_name>, and you must create an input monitor to monitor that file directory for threat intelligence.

Create an input monitor for threat sources to add threat intelligence to a different folder than the one monitored by the da_ess_threat_local modular input.

1. From the Enterprise Security menu bar, select Configure > Data Enrichment > Threat Intelligence Management.
2. Click New
3. Type a descriptive name for the modular input. The name cannot include spaces.
4. Type a path to the file repository. The file repository must be $SPLUNK_HOME/etc/apps/<app_name>/local/data/<directory_name>
5. (Optional) Type a maximum file size in bytes.
6. (Optional) Select the Sinkhole check box. If selected, the modular input deletes each file in the directory after processing the file.
7. (Optional) Select the Remove Unusable check box. If selected, the modular input deletes a file after processing it if it has no actionable threat intelligence.
8. (Optional) Type a number to use as the default weight for all threat intelligence documents consumed from this directory.

Next step

To add another custom threat source, see Add threat intelligence to Splunk Enterprise Security and follow the link that matches the source that you want to add.

If you are finished adding threat intelligence sources, see Verify that you have added threat intelligence successfully in Splunk Enterprise Security.

Upload a custom CSV file of threat intelligence in Splunk Enterprise Security

You can add a custom file of threat intelligence to Splunk Enterprise Security.

Prerequisite

Format the custom CSV file by adding headers for each type of intelligence in the file. The custom file can contain multiple types of intelligence, but you must
include headers for each column in the CSV file. See Supported types of threat intelligence in Splunk Enterprise Security for the headers relevant for each type of threat intelligence.

Add the custom file to Splunk Enterprise Security.

1. On the Enterprise Security menu bar, select Configure > Data Enrichment > Threat Intelligence Uploads.
2. Type a file name for the file you want to upload. The file name you type becomes the name of the file saved to
   $SPLUNK_HOME/etc/apps/DA-ESS-ThreatIntelligence/local/data/threat_intel.
   The file name cannot include spaces or special characters.
3. Upload the CSV-formatted file.
4. Type a Weight for the threat list. The weight of a threat file increases the risk score of objects associated with threat intelligence on this list.
5. (Optional) Type a Threat Category.
6. (Optional) Type a Threat Group.
7. (Optional) Select the Overwrite check box. If you have previously uploaded a file with the same file name, select this check box to overwrite the previous version of the file.
8. (Optional) Select the Sinkhole check box. This deletes the file after the intelligence from the file is processed.
9. Click Save.

Next step

To add another custom threat source, see Add threat intelligence to Splunk Enterprise Security and follow the link that matches the source that you want to add.

If you are finished adding threat intelligence sources, see Verify that you have added threat intelligence successfully in Splunk Enterprise Security.

Add threat intelligence from Splunk events in Splunk Enterprise Security

You can add threat intelligence from Splunk events to the local threat intelligence lookups.

1. Write a search that produces threat indicators.
2. Add `outputlookup local_<threat intelligence type>_intel append=t` to the end of the search.

For example, write a search that produces a list of IP addresses that are testing a web server for vulnerabilities and add them to the `local_ip_intel` lookup to be processed by the modular input and added to the `ip_intel` KV Store collection.

Next step

To add another custom threat source, see Add threat intelligence to Splunk Enterprise Security and follow the link that matches the source that you want to add.

If you are finished adding threat intelligence sources, see Verify that you have added threat intelligence successfully in Splunk Enterprise Security.

Add and maintain threat intelligence locally in Splunk Enterprise Security

Each threat collection has a local lookup file that you can use to manually add threat intelligence.

1. On the Enterprise Security menu bar, select Configure > Content > Content Management.
2. Find the local lookup that matches the type of threat indicator you want to add. For example, Local Certificate intel to add information about malicious or spoofed certificates.
3. Click the lookup name to edit the lookup.
4. Add indicators to the lookup. Right-click and select Insert Row Below to add new rows as needed.
5. (Optional) Type a numeric Weight to change the risk score for objects associated with indicators on this threat intelligence source.
6. Click Save.

Next step

To add another custom threat source, see Add threat intelligence to Splunk Enterprise Security and follow the link that matches the source that you want to add.
If you are finished adding threat intelligence sources, see Verify that you have added threat intelligence successfully in Splunk Enterprise Security.

Add threat intelligence with a custom lookup file in Splunk Enterprise Security

You can add threat intelligence to Splunk Enterprise Security as a custom lookup file. Add a custom lookup file in this way if you want to edit the lookup file in Splunk Enterprise Security. If you want to add a lookup file to have the intelligence in it extracted once, upload the CSV file instead. See Upload a custom CSV file of threat intelligence in Splunk Enterprise Security.

A lookup-based threat source can add data to any of the supported threat intelligence types, such as file or IP intelligence. See Supported types of threat intelligence in Splunk Enterprise Security.

Prerequisite

Create the custom CSV file. The custom file can contain multiple types of intelligence, but you must include headers for each column in the CSV file. See Supported types of threat intelligence in Splunk Enterprise Security for the headers relevant for each type of threat intelligence.

Steps

First, add the lookup to Splunk Enterprise Security.

1. Select Configure > Content > Content Management.
2. Select Create New Content > Lookup.
3. Click Create New.
4. Select the lookup file to upload.
5. Select an App of SA-ThreatIntelligence.
6. (Optional) Modify the file name. For example, type threatindicatorszerodayattack.csv.
7. (Optional) Modify the definition name. For example, zero_day_attack_threat_indicators_list.
8. Leave the default lookup type of Manual editing.
9. Type a label for the lookup. The label appears as the name for the lookup on the Content Management page. For example, Zero Day Threat Indicators.
10. Type a description for the lookup. For example, File-based threat indicators from zero day malware.
11. Save.

Next, add a threat source input stanza that corresponds to the lookup file so that ES can parse the threat intelligence.

1. Select Configure > Data Enrichment > Intelligence Downloads.
2. Click New.
3. Type a Name. The name cannot include spaces. For example, zero_day_attack_threat_indicators.
4. Type a Type. For example, zero_day_IOCs.
5. Type a Description. For example, File-based threat indicators from zero day malware.
6. Type a URL that references the lookup definition you created. For example, lookup://zero_day_attack_threat_indicators_list
7. (Optional) Change the default Weight for the threat data.
8. (Optional) Change the default Retry interval for the lookup.
9. If your lookup contains multiple types of threat intelligence, type the headers in the Fields section.
10. Save.

Next step

To add another custom threat source, see Add threat intelligence to Splunk Enterprise Security and follow the link that matches the source that you want to add.

If you are finished adding threat intelligence sources, see Verify that you have added threat intelligence successfully in Splunk Enterprise Security.

Verify that you have added intelligence successfully to Splunk Enterprise Security

After you add new intelligence sources or configure included intelligence sources, verify that the intelligence is being parsed successfully and that threat indicators are being added to the threat intelligence KV Store collections. The modular input responsible for parsing intelligence runs every 60 seconds.
Verify that the intelligence source is being downloaded

This verification procedure is relevant only for URL-based sources and TAXII feeds.

1. From the Enterprise Security menu bar, select **Audit > Threat Intelligence Audit**.
2. Find the intelligence source and confirm that the **download_status** column states **threat list downloaded**.
3. Review the **Intelligence Audit Events** to see if there are errors associated with the lookup name.

If the download fails, attempt the download directly from the terminal of the Splunk server using a curl or wget utility. If the intelligence source can be successfully downloaded using one of these utilities, but is not being downloaded successfully in Splunk Enterprise Security, ask your system administrator whether you need to specify a custom user-agent string to bypass network security controls in your environment. See step 12 in **Add a URL-based threat source**.

Verify that threat indicators exist in the threat collections

For threat intelligence sources, verify that the threat intelligence was successfully parsed and threat indicators exist in the threat collections.

1. Select **Security Intelligence > Threat Intelligence > Threat Artifacts**.
2. Search for the threat source name in the **Intel Source ID** field.
3. Confirm that threat indicators exist for the threat source.

Troubleshoot parsing errors

Review the following log files to troubleshoot errors that can occur when parsing intelligence sources in order to add them to Enterprise Security.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Suggestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issues related to downloading intelligence sources.</td>
<td>Look at the Intelligence Audit Events panel on the Threat Intelligence Audit dashboard. Look for events from the threatlist.log file with the threatintel:download sourcetype.</td>
</tr>
<tr>
<td>Issues related to parsing or</td>
<td>Look at the Intelligence Audit Events panel on the Threat Intelligence Audit dashboard. Look for events from the threatlist.log file with the threatintel:download sourcetype.</td>
</tr>
<tr>
<td>Problem</td>
<td>Suggestion</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>--------------------------------------------------------------</td>
</tr>
<tr>
<td>processing</td>
<td>threat_intelligence_manager.log file with the threatintel:manager sourcetype.</td>
</tr>
<tr>
<td>Errors result from uploading a file</td>
<td>Review the threat_intel_file_upload_rest_handler.log file.</td>
</tr>
<tr>
<td>Other parsing errors</td>
<td>Verify that the modular inputs are running as expected. See python_modular_input.log for errors associated with modular input failures.</td>
</tr>
</tbody>
</table>

Change existing intelligence in Splunk Enterprise Security

After you add intelligence to Splunk Enterprise Security, you can make changes to the settings to make sure the intelligence you correlate with events is useful.

**Disable an intelligence source**

Disable an intelligence source to stop downloading information from the source. This also prevents new threat indicators from the disabled source from being added to the threat intelligence collections.

1. From the Enterprise Security menu bar, select **Configure > Data Enrichment > Intelligence Downloads**.
2. Find the intelligence source.
3. Under **Status**, click **Disable**.

**Disable individual threat artifacts**

To prevent individual threat artifacts on a threat list from creating notable events if they match events in your environment, disable individual threat artifacts. If you have command line access to the Enterprise Security search head, you can disable individual threat artifacts using the REST API. See Threat Intelligence API reference in Splunk Enterprise Security REST API Reference.

**Edit an intelligence source**

Change information about an existing intelligence source, such as the retention period or the download interval for the source.
1. From the Enterprise Security menu bar, select **Configure > Data Enrichment > Intelligence Downloads**.
2. Click the name of the intelligence source you want to edit.
3. Make changes to the fields as needed.
4. Save your changes.

By default, only administrators can edit intelligence sources. To allow non-admin users to edit intelligence sources, see Adding capabilities to a role in the *Installation and Upgrade Manual*.

**Configure threat source retention**

Remove threat intelligence from the KV Store collections in Splunk Enterprise Security based on the date that the threat intelligence was added to Enterprise Security.

The default maximum age is `-30d` for 30 days of retention in the KV Store. To remove the data more often, use a smaller number such as `-7d` for one week of retention. To keep the data indefinitely, use a blank field. However, if the KV Store collection is stored indefinitely, the .csv files that result from lookup-generating searches can grow large enough to impact search head cluster replication performance. If you manually delete the data from the .csv file, the maximum age timer does not reset based on the edit date, and the data is still removed from the KV Store after the maximum age expires.

1. If the threat intelligence source is not a TAXII feed, define the maximum age of the threat intelligence. This field is not used for TAXII feeds.
   1. From the Enterprise Security menu bar, select **Configure > Data Enrichment > Intelligence Downloads**.
   2. Select an intelligence source.
   3. Change the **Maximum age** setting using a relative time specifier.
2. Enable the retention search for the collection.
   1. From the Splunk platform menu bar, select **Settings** and click **Searches, reports, and alerts**.
   2. Search for "retention" using the search filter.
   3. Enable the retention search for the collection that hosts the threat source. All retention searches are disabled by default.

**Configure threat intelligence file retention**

Configure how long files are stored by Splunk Enterprise Security after processing. Modular inputs managed on the Threat Intelligence Management page handle file parsing of intelligence sources. Modify the settings of the local
modular inputs to manage global file retention for intelligence sources, or modify individual settings for each download or upload to more granularly control file retention.

Use the following table to determine the conditions under which Splunk Enterprise Security deletes a file after processing. For files placed into a directory by a script, for example, use the modular input sinkhole.

<table>
<thead>
<tr>
<th>Sinkhole set for modular input</th>
<th>Sinkhole set for individual file</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>False</td>
<td>False</td>
<td>File not deleted.</td>
</tr>
<tr>
<td>False</td>
<td>True</td>
<td>File deleted.</td>
</tr>
<tr>
<td>True</td>
<td>True</td>
<td>File deleted.</td>
</tr>
<tr>
<td>True</td>
<td>False</td>
<td>File deleted.</td>
</tr>
</tbody>
</table>

*Remove files managed by a specific modular input*

Use the sinkhole or the remove unusable settings to selectively remove files managed by a modular input.

1. From the Enterprise Security menu bar, select Configure > Data Enrichment > Threat Intelligence Management.
2. Select the modular input for the file retention settings that you want to modify.
   1. For downloaded files, select the sa_threat_local modular input.
   2. For uploaded files, select the da_ess_threat_local modular input.
3. Select the Sinkhole check box so that the modular input deletes each file in the directory after processing.
4. Select the Remove Unusuable check box so that the modular input deletes a file after processing if it has no actionable intelligence.
5. Save your changes.

*Remove files associated with a specific download*

Use the sinkhole check box to remove files associated with a threat intelligence download.

1. From the Enterprise Security menu bar, select Configure > Data Enrichment > Intelligence Downloads.
2. Locate the threat intelligence download.
3. Select the Sinkhole check box.
4. Save your changes.

**Remove files associated with a specific upload**

When you upload the file, select the sinkhole check box to delete the file after processing.

- See Upload a STIX or OpenIOC structured threat intelligence file in Splunk Enterprise Security.
- See Upload a custom CSV file of threat intelligence in Splunk Enterprise Security.

**Example: Add a ransomware threat feed to Splunk Enterprise Security**

This example describes how to add a list of blocked domains that could host ransomware to Splunk Enterprise Security to better prepare your organization for a ransomware attack. Replace the feed used in this example with a feed of your choice.

1. On the Enterprise Security menu bar, select **Configure > Data Enrichment > Intelligence Downloads**.
2. Click **New** to add a new threat intelligence source.
3. Type a **Name** of **ransomware_tracker** to describe the threat download source.
4. Type a **Type** of **domain** to identify the type of threat intelligence contained in the threat source.
5. Type a **Description** of **Blocked domains that could host ransomware**.
6. Type a **URL** of **https://v.firebog.net/hosts/Shalla-mal.txt**.
7. (Optional) Change the default **Weight** of 1 to 2 because ransomware is a severe threat and you want an extra risk score multiplier for assets or identities associated with blocked ransomware domains.
8. Leave the default **Interval** of 43200 seconds, or every 12 hours.
9. Leave the **POST arguments** field blank because this type of feed does not accept POST arguments.
10. Decide whether to define a **Maximum age** for the threat intelligence. According to the ransomware tracker website, items on the blocklist stay on the blocklist for 30 days. To drop items off the blocklist in Enterprise Security sooner than that, set a maximum age of less than 30 days. Type a maximum age of **−7d**.
11. Determine whether you need to specify a **User agent** string due to security controls in your environment. If not, leave this field blank.
12. Type a default **Delimiting regular expression** of `:` so that you can enrich the threat indicators by adding fields.
13. Leave the **Extracting regular expression** field blank because the domain names do not need to be extracted because they are line-delimited.
14. Type **Fields** of `domain:$1,description:ransomware_domain_blocklist` to define the fields in this blocklist.
15. (Optional) Leave the default **Ignoring regular expressions** field.
16. Change the **Skip header lines** field to 0 because the ignoring regular expression ignores the comments at the top of the feed.
17. Leave the **Retry interval** at the default of 60 seconds.
18. (Optional) Leave the **Remote site user** and **Remote site user realm** fields blank because this feed does not require any form of authentication.
19. Leave the **Retries** field at the default of 3.
20. Leave the **Timeout** field at the default of 30 seconds.
21. Ignore the **Proxy Options** section unless you are using a proxy server to add threat intelligence to Splunk Enterprise Security.
22. Click **Save**.
23. From the Splunk platform menu bar, select **Apps > Enterprise Security** to return to Splunk Enterprise Security.
24. From the Enterprise Security menu bar, select **Audit > Threat Intelligence Audit**.
25. Find the **ransomware_tracker** stanza in the **Threat Intelligence Downloads** panel and verify that the **status** is **threat list downloaded**.
26. From the Enterprise Security menu bar, select **Security Intelligence > Threat Intelligence > Threat Artifacts**.
27. Type an **Intel Source ID** of **ransomware_tracker** to search for domains added to Splunk Enterprise Security from the new threat feed.
28. Click **Submit** to search.
29. Click the **Network** tab and review the **Domain Intelligence** panel to verify that threat intelligence from the **ransomware_tracker** threat source appears.
Generic Intelligence

Add intelligence to Splunk Enterprise Security

As an ES administrator, you can use the threat intelligence framework in Splunk Enterprise Security to download and parse other forms of intelligence that you can use to correlate with events or enrich dashboards using search. Adding these generic forms of intelligence enhances your analysts’ security monitoring capabilities and adds context to their investigations.

Splunk Enterprise Security includes a few intelligence sources. Splunk Enterprise Security also supports adding other generic intelligence sources.

ES administrators can add generic intelligence to Splunk Enterprise Security by downloading a feed from the Internet.

1. Configure the intelligence sources included with Splunk Enterprise Security.
2. Download an intelligence feed from the Internet.
3. Verify that you have added intelligence successfully in Splunk Enterprise Security.
4. Use generic intelligence in search with inputintelligence.

Download an intelligence feed from the Internet in Splunk Enterprise Security

Splunk Enterprise Security can periodically download an intelligence feed available from the Internet and store it in the $SPLUNK_DB/modinput/threatlist directory. You can then use the inputintelligence search command to use the intelligence in reports, searches, or dashboards. See Example: Add a generic intelligence source to Splunk Enterprise Security.

1. (Optional) Configure a proxy for retrieving intelligence.
2. Add a URL-based intelligence source.

Configure a proxy for retrieving intelligence

If you use a proxy server to send intelligence to Splunk Enterprise Security, configure the proxy options for the intelligence source.
The user must correspond to the name of a Splunk secure stored credential in Credential Management. If you remove an existing proxy user and password in the Intelligence Download Setting editor, the download process no longer references the stored credentials. Removing the reference to the credential does not delete the stored credentials from Credential Management. For more information, see Manage credentials in Splunk Enterprise Security.

1. On the Enterprise Security menu bar, select Configure > Data Enrichment > Intelligence Downloads.
2. Select the download source.
3. Configure the proxy options.
   1. Type a proxy server address. The Proxy Server cannot be a URL. For example, 10.10.10.10 or server.example.com.
   2. Type a proxy server port to use to access the proxy server address.
   3. Type a proxy user credential for the proxy server. Only basic and digest authentication methods are supported. The user must correspond to the name of a credential stored in Credential Management.
   4. (Optional) Type a proxy user realm for the proxy user credential. Use this to specify a proxy user realm for the user credential.
4. Save your changes.

Add a URL-based intelligence source

Add a non-TAXII source of intelligence that is available from a URL on the Internet. For an example of adding a URL-based generic intelligence source, see Example: Add a generic intelligence source to Splunk Enterprise Security.

1. On the Enterprise Security menu bar, select Configure > Data Enrichment > Intelligence Downloads.
2. Type a Name for the download. The name can only contain alphanumeric characters, hyphens, and underscores. The name cannot contain spaces.
3. Click New to add a new intelligence source.
4. Do not select the check box for Sinkhole.
5. Deselect the check box for Is Threat Intelligence.
6. Type a Type for the download. The type identifies the type of information that the feed contains.
7. Type a Description. Describe the information in the feed.
8. Leave the default Weight because the field does not matter for the generic intelligence source.
9. (Optional) Change the default download Interval for the feed. Defaults to 43200 seconds, or every 12 hours.
10. (Optional) Type POST arguments for the feed. You can use POST arguments to retrieve user credentials from Credential Management. Use the format `key=$user:<username>$` or `key=$user:<username>,realm:<realm>$` to specify a username and realm.

11. Do not use the **Maximum age** setting.

12. (Optional) If you need to specify a custom **User agent** string to bypass network security controls in your environment, type it in the format `<user-agent>/<version>`. For example, `Mozilla/5.0` or `AppleWebKit/602.3.12`. The value in this field must match this regex: `([A-Za-z0-9_.-]+)(/[A-Za-z0-9_.-]+)`. Check with your security device administrator to ensure the string you type here is accepted by your network security controls.

13. Fill out the **Parsing Options** fields to make sure that your list parses successfully. You must fill out either a delimiting regular expression or an extracting regular expression. You cannot leave both fields blank.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delimiting regular expression</td>
<td>A regular expression string used to split, or delimit, lines in an intelligence source. For complex delimiters, use an extracting regular expression.</td>
<td>, or : or \t</td>
</tr>
<tr>
<td>Extracting regular expression</td>
<td>A regular expression used to extract fields from individual lines of an intelligence source document. Use to extract values in the intelligence source.</td>
<td>^\S+\t+(\S+)\t+\S+\t+\S+\t+(\S*)</td>
</tr>
<tr>
<td>Fields</td>
<td>Required if your document is line-delimited. Comma-separated list of fields to be extracted from the intelligence list. Can also be used to rename or combine fields. Description is a required field. Additional acceptable fields are the fields in the corresponding KV Store collection for the threat intelligence, visible in the local lookup files or the DA-ESS-ThreatIntelligence/collections.conf file. Defaults to description:$1,ip:$2.</td>
<td>&lt;fieldname&gt;:&lt;number&gt;,&lt;fieldname&gt;:&lt;number&gt;,ip:$1,description:domain_blocklist</td>
</tr>
<tr>
<td>Ignoring regular expression</td>
<td>A regular expression used to ignore lines in an intelligence source. Defaults to ignoring blank lines and comments that begin with #.</td>
<td>^\s*$</td>
</tr>
<tr>
<td>Skip header lines</td>
<td>The number of header lines to skip when processing the intelligence source.</td>
<td>0</td>
</tr>
</tbody>
</table>
### Field Description Example

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence file encoding</td>
<td>If the file encoding is something other than ASCII or UTF8, specify the encoding here. Leave blank otherwise.</td>
<td>latin1</td>
</tr>
</tbody>
</table>

14. (Optional) Change the **Download Options** fields to make sure that your list downloads successfully.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retry interval</td>
<td>Number of seconds to wait between download retry attempts. Review the recommended poll interval of the intelligence source provider before changing the retry interval.</td>
<td>60</td>
</tr>
<tr>
<td>Remote site user</td>
<td>If the threat feed requires authentication, type the user name to use in remote authentication, if required. The user name you add in this field must match the name of a credential in Credential Management. See Manage input credentials in Splunk Enterprise Security.</td>
<td>buttercup</td>
</tr>
<tr>
<td>Remote site user realm</td>
<td>If the threat feed requires authentication, type the user name to use in remote authentication, if required. The realm you add in this field must match the realm of a credential in Credential Management. See Manage input credentials in Splunk Enterprise Security.</td>
<td>paddock</td>
</tr>
<tr>
<td>Retries</td>
<td>The maximum number of retry attempts.</td>
<td>3</td>
</tr>
<tr>
<td>Timeout</td>
<td>Number of seconds to wait before marking a download attempt as failed.</td>
<td>30</td>
</tr>
</tbody>
</table>

15. (Optional) If you are using a proxy server, fill out the **Proxy Options** for the feed. See Configure a proxy for retrieving intelligence.

16. Save your changes.

If you are finished adding intelligence sources, see Verify that you have added intelligence successfully in Splunk Enterprise Security.

### Use generic intelligence in search with `inputintelligence`

After you add generic intelligence to Splunk Enterprise Security, you can use the `inputintelligence` command to make use of the intelligence. See Add generic
intelligent intelligence to Splunk Enterprise Security.

Description

Use the `inputintelligence` command to add intelligence from the threatlist directory to your search results. When downloaded, generic intelligence is parsed and stored in the `$SPLUNK_DB/modinputs/threatlist$` directory.

Syntax

```
| inputintelligence <threatlist_stanza_name> [fields=<string>] [delim_regex=<string>] [extract_regex=<string>] [ignore_regex=<string>] [skip_header_lines=<int>] [include_raw=<bool>] [append=<bool>] [no_parse=<bool>]
```

**Required arguments**

`threatlist_stanza_name`

**Syntax:** `<string>`

**Description:** The stanza of the intelligence download. Matches the Name field on the Intelligence Downloads page. You can include multiple stanza names in your search. See Download an intelligence feed from the Internet in Splunk Enterprise Security.

**Optional arguments**

`fields`

**Syntax:** `<string>`

**Description:** Overrides the default fields setting for the intelligence download defined in the Intelligence Download page. Required if your document is line-delimited. Comma-separated list of fields to be extracted from the intelligence list. Can also be used to rename or combine fields. Description is a required field. Additional acceptable fields are the fields in the corresponding KV Store collection for the threat intelligence, visible in the local lookup files or the DA-ESS-ThreatIntelligence/collections.conf file. Defaults to description:$1,ip:$2.

`delim_regex`

**Syntax:** `<string>`
**Description:** Overrides the default delimiting regular expression setting for the intelligence download defined in the Intelligence Download page. A regular expression string used to split, or delimit, lines in an intelligence source. For complex delimiters, use an extracting regular expression.

**extract_regex**

**Syntax:** <string>
**Description:** Overrides the default extracting regular expression setting for the intelligence download defined in the Intelligence Download page. A regular expression used to extract fields from individual lines of an intelligence source document. Use to extract values in the intelligence source.

**ignore_regex**

**Syntax:** <string>
**Description:** Overrides the default ignore regular expression setting for the intelligence download defined in the Intelligence Download page. A regular expression used to ignore lines in an intelligence source. Defaults to ignoring blank lines and comments that begin with #.

**skip_header_lines**

**Syntax:** <int>
**Description:** Overrides the default skip header lines setting for the intelligence download defined in the Intelligence Download page. The number of header lines to skip when processing the intelligence source. **Default:** 0

**include_raw**

**Syntax:** <bool>
**Description:** If 1, t, or true, adds the original line content to an additional column called raw. **Default:** 0

**append**

**Syntax:** <bool>
**Description:** If 1, t, or true, appends the results of the `inputintelligence` command to an existing set of search results instead of replacing it. **Default:** 0
Syntax: `<bool>`

Description: If 1, t, or true all other options are ignored and the raw contents of the intelligence file is returned one line per row.

Default: 0

Usage

The `inputintelligencet` command is a transforming command.

Examples

1. View the top one million sites

View the top one million sites according to Cisco.

`inputintelligencet cisco_top_one_million_sites`

2. Further examples

See Example: Add a generic intelligence source to Splunk Enterprise Security.

See also

`inputlookup`

Example: Add a generic intelligence source to Splunk Enterprise Security

As a security analyst, you want to compare hosts seen in your network with the hosts associated with Spotify advertisements so that you can assess the risk that listening to Spotify Free during the work day poses to your network. The hosts associated with Spotify ads are not malicious, and you do not want to add them to Splunk Enterprise Security as threat intelligence. Instead, you can add them as generic intelligence.

Download the generic intelligence

First, create a download configuration for the list.
1. Select **Configure > Data Enrichment > Intelligence Downloads.**
2. Click **New.**
3. Type a **Name** of `spotify_ads`.
4. Deselect the check box for **Is Threat Intelligence.**
5. Type a **Type** of `spotify_ads`.
6. Type a **Description** of Hostnames of machines hosting Spotify ads.
7. Type a URL of  
   ```
   https://raw.githubusercontent.com/FadeMind/hosts.extras/master/StreamingAds/hosts
   ```
8. (Optional) Change the default **Weight.**
9. (Optional) Change the default **Interval.**
10. Type a delimiting regular expression of `\s`.
11. Type **Fields** of `url:$2`.
12. Type an **Ignoring regular expression** of `(^#|\s*$)`.
13. Save.

**Verify that the intelligence downloads successfully**

Using search, verify that the modular input is downloading information from the source.

```
| inputintelligence no_parse=1 spotify_ads
```

**Verify that the intelligence parses correctly**

Use the custom search command `inputintelligence` to verify that the intelligence parses correctly.

```
| inputintelligence spotify_ads
```

If the intelligence does not seem to be parsing correctly, review `search.log` for any error messages. In addition, you can change the parsing settings for the download using the optional arguments for the `inputintelligence` command to determine the correct settings. See **Use generic intelligence in search with inputintelligence.**

**Use the new intelligence source in a search**

You can use the new intelligence source in many ways in searches.

**Use Spotify ads in a subsearch**

To return 100 URLs used by Spotify ads in a list with the following subsearch:
Use Spotify ads in join

Join the hosts in the Spotify ads intelligence source with another set of data with join:

```plaintext
... | join url [ | inputintelligence spotify_ads | eval spotify_ad="true"] | search spotify_ad="true"
```

Add Spotify ads to a lookup table file

Add the hosts from Spotify ads to a lookup table file using a lookup generating search:

```plaintext
| inputintelligence spotify_ads | eval spotify_ad="true" | outputlookup spotify_ads.csv
```

After creating the lookup, use it in search with the following example search:

```plaintext
... | lookup spotify_ads.csv url OUTPUT spotify_ad | search spotify_ad="true"
```
Managing Content

Managing content in Splunk Enterprise Security

As a Splunk Enterprise Security administrator, you can use the Content Management page to display, create, configure, and edit content that is unique to Splunk Enterprise Security, such as correlation searches, key indicators, saved searches, and swim lane searches.

- Create correlation searches in Splunk Enterprise Security
- Create and manage data models in Splunk Enterprise Security
- Create and manage key indicator searches in Splunk Enterprise Security
- Create and manage lookups in Splunk Enterprise Security
- Create and manage saved searches in Splunk Enterprise Security
- Create and manage search-driven lookups in Splunk Enterprise Security
- Create and manage swim lane searches in Splunk Enterprise Security
- Create and manage views in Splunk Enterprise Security
- Export content from Splunk Enterprise Security as an app

See also

- Create and edit risk objects in Splunk Enterprise Security

Create and manage data models in Splunk Enterprise Security

Create and manage data models using the Content Management page in Splunk Enterprise Security.

- Review the list of data models in Splunk Enterprise Security.
- Review the next scheduled time, acceleration status, and choose whether or not to accelerate a data model.
- Click a data model name to edit the data model.

Create a data model

1. From the Enterprise Security menu bar, select **Configure > Content > Content Management**.
2. Click **Create New Content** and select **Data Model**.

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3. Create a data model following the instructions in the Splunk platform documentation.
   ✦ For Splunk Enterprise, see Create a data model in the Splunk Enterprise Knowledge Manager Manual.
   ✦ For Splunk Cloud, see Design data models in the Splunk Cloud Knowledge Manager Manual.

Create and manage key indicator searches in Splunk Enterprise Security

Configure key indicator searches on Content Management in Splunk Enterprise Security. Use the filters to select a type of key indicator to view only key indicator searches.

Create a custom key indicator search

Create a key indicator search to create a key indicator that you can add to a dashboard or glass table as a security metric.

1. From the Enterprise Security menu bar, select Configure > Content > Content Management.
2. Click Create New Content and select Key Indicator Search.
3. Type a key indicator name.
   In order for the key indicator to show up in the list of security metrics on glass table, type a category or security domain at the beginning of the key indicator name followed by a hyphen. For example, APT - Example Key Indicator or Access - Sample Key Indicator.
4. Type a search, and other details.
   The key indicators that come with Enterprise Security use data models to accelerate the return of results.
5. (Optional) Select Schedule to use data model acceleration for your custom key indicator.
6. Type the name of the field that corresponds to the value of the key indicator in the Value field.
7. Type the name of the field that corresponds to the change in the key indicator in the Delta field.
8. (Optional) Type a Threshold for the key indicator. The threshold controls whether the key indicator changes color. You can also set the threshold in dashboards and on glass tables.
9. Type a Value Suffix to indicate units or another word to follow the key indicator.
10. Select the **Invert** check box to invert the colors of the key indicator. Select this check box to indicate that a high value is good and a low value is bad.

11. Click **Save**.

**Schedule a key indicator search**

Key indicators included with Splunk Enterprise Security use data model acceleration. Enable acceleration and schedule the search to run as a **scheduled report**. Scheduled report results are cached, allowing the indicator to display results on the dashboard more quickly.

1. Select **Configure > Content > Content Management**.
2. Locate the key indicator search that you want to accelerate.
3. Click **Accelerate** in the **Actions** column.
4. In the **Edit Acceleration** window, select the **Accelerate** check box.
5. Select a **Refresh Frequency** for how often Enterprise Security should update the cached results.
6. Click **Save**.

After a key indicator is accelerated, the **Next Scheduled Time** populates on the **Content Management** page and the lightning bolt for that indicator changes from grey to yellow.

**Edit a key indicator search**

Make changes to a key indicator search.

1. From the ES menu bar, select **Configure > Content > Content Management**
2. Select a key indicator search.
3. (Optional) Change the search name.
4. (Optional) Change the destination app where the search is stored.
5. (Optional) Change the title of the key indicator. The title appears above the key indicator on a dashboard, or next to the security metric on a glass table.
6. (Optional) Change the sub-title of the key indicator that is used to describe the type of the key indicator function on dashboards.
7. (Optional) Change the search string that populates the key indicator.
8. (Optional) Add a drilldown URL such as a custom search or dashboard link to override the default drilldown behavior. By default, the key indicator drilldown opens the search results that produced the key indicator value. For key indicators on glass tables, you can set a custom drilldown when you add the key indicator to the glass table.
9. (Optional) Select the Schedule check box to enable acceleration for a key indicator and allow it to load faster on a dashboard.
10. (Optional) Change the Cron Schedule frequency using standard cron notation.
11. (Optional) Change the Threshold behavior to determine the color assigned to the value indicator. By default, no threshold produces a black value indicator, a threshold number higher than the count of a value indicator produces a green value indicator, and a threshold number lower than the count of a value indicator produces a red value indicator.
12. (Optional) Add a Value suffix to describe the value indicator. For example, specify units. On dashboards, the value suffix appears between the value indicator and the trend indicator.
13. (Optional) Select the Invert check box to change the default colors of the trend indicator threshold. If this check box is selected, a threshold number higher than the count of a value indicator produces a red value indicator, and a threshold number lower than the count of a value indicator produces a green value indicator.
14. Click Save.

Create and manage saved searches in Splunk Enterprise Security

Create a saved search, also called a scheduled report, in Splunk Enterprise Security.

1. From the Enterprise Security menu bar, select Configure > Content > Content Management.
2. Click Create New Content and select Saved Search.
3. Create a saved search, also called a scheduled report, following the instructions in the Splunk platform documentation.
   ♦ For Splunk Enterprise, see Create a new report in the Splunk Enterprise Reporting Manual.
   ♦ For Splunk Cloud, see Create a new report in the Splunk Cloud Reporting Manual.
4. Modify the permissions of the report to share it with Enterprise Security so that you can view and manage the search in Enterprise Security, following the instructions in the Splunk platform documentation.
   ♦ For Splunk Enterprise, see Set report permissions in the Splunk Enterprise Reporting Manual.
   ♦ For Splunk Cloud, see Set report permissions in the Splunk Cloud Reporting Manual.
Create and manage search-driven lookups in Splunk Enterprise Security

A search-driven lookup lets you create a lookup based on the results of a search that runs at regular scheduled intervals. The search can run only against data stored in data models or in an existing lookup. Lookups created as search-driven lookups are excluded from bundle replication and are not sent to the indexers.

When to use search-driven lookups

Create a search-driven lookup if you want to know when something new happens in your environment, or need to consistently update a lookup based on changing information from a data model or another lookup.

The search-driven lookup collects and stores information from data models or other lookups. The data stored in the lookup represents a historical summary of selected fields gathered from events. You can view changes on a dashboard or use a correlation search to compare data from the search-driven lookup with new events, and alert if there is a match. For example, to find out when a new user logs in to a web server.

1. Search for user data in the Authentication data model and filter by the web server host name with the `where` command.
2. Verify the search results match the known hosts and users in your environment.
3. Create a guided search-driven lookup to collect and store information on a recurring schedule about users logging in to the web servers.
4. Create a correlation search that alerts you when a user logs in to one of the web servers that he or she has not accessed in the past, based on the historical information in the search-driven lookup.

Create a search-driven lookup

When you create a search-driven lookup, two knowledge objects are created. One knowledge object is the lookup that is generated by the search, while the other knowledge object is the search that drives the lookup.

Create a search-driven lookup as follows:

1. From the Splunk Enterprise Security menu bar, select **Configure > Content > Content Management**.
2. Click **Create New Content** and select **Search-Driven Lookup**.
3. (Optional) Select an **App**. The default app is SplunkEnterpriseSecuritySuite. You can create the lookup in a specific app, such as SA-NetworkProtection, or a custom app. You cannot change the app after you save the search-driven lookup.

4. (Optional) Type a description for the search.

5. Type a label for the lookup. This is the name of the search-driven lookup that appears on **Content Management**.

6. Type a name for the lookup. After you save the lookup, the name cannot be changed.

7. Type a cron schedule to define how often you want the search to run.

8. Select real-time or continuous scheduling for the search. Real-time scheduling prioritizes search performance, while continuous scheduling prioritizes data integrity.

9. Type a **Search Name** to define the name of the saved search. After you save the lookup, the name cannot be changed.

10. Select a mode of **Guided** to create a search without having to write the search syntax yourself, or select **Manual** to write your own search. See the example for help building a search with the guided search editor.

11. If you create a search in manual mode, type a search.

12. Click **Save** to save the search.

### Example search-driven lookup

In this example search-driven lookup included with Splunk Enterprise Security, you want to track attacks identified by your intrusion detection system (IDS). You can then be notified of new attacks with a correlation search, or determine whether an attack is new to your environment or not. The Intrusion Center dashboard uses this search-driven lookup for the New Attacks - Last 30 Days panel. See Intrusion Center dashboard.

1. From the Splunk Enterprise Security menu bar, select **Configure > Content > Content Management**.

2. Click **Create New Content** and select **Search-Driven Lookup**.

3. (Optional) Select an **App** of SA-NetworkProtection. You cannot change the app after you save the search-driven lookup.

4. Type a description of "Maintains a list of attacks identified by an IDS and the first and last time that the attacks were seen."

5. Type a label of **IDS Attack Tracker Example** for the lookup. This is the name of the search-driven lookup that appears on **Content Management**.

6. Type a unique and descriptive name for the lookup of **ids_attack_tracker_example**. After you save the lookup, the name cannot be changed.
7. Type a cron schedule to define how often you want the search to run. If your IDS collects data often, type a cron schedule of 25 * * * * to run the search at 25 minutes every hour every day.
8. Select a Continuous Schedule because the lookup must track all data points.
9. Type a Search Name of Network - IDS Attack Tracker - Example Lookup Gen.
10. Select guided mode to use the guided search editor to create the search.
11. Click Open guided search editor to start creating the search.
12. Select a data source of Data Model because the IDS Attack data is stored in a data model.
13. Select a data model of Intrusion_Detection and a data model dataset of IDS_Attacks.
14. Select Yes for the summaries only field to run the search against only the data in the accelerated data model.
15. Select a time range that uses Relative time that begins with an earliest time of 70 minutes ago, starting at the beginning of the minute, and ends now. Click Apply to save the time range.
16. Click Next.
17. (Optional) Type a where clause to filter the data from the data model to only the data from a specific IDS vendor and click Next.
18. Add aggregate values to track specific statistics about the data and store that information in the lookup. At least one aggregate is required.
   1. To track the first time that an IDS attack was seen in your environment, add a new aggregate with a function of min and a field of _time and save it as firstTime.
   2. Track the last time an attack was seen by adding another aggregate with a max function and a field of _time and saving it as lastTime. This creates two columns in the lookup, firstTime and lastTime.
19. Add split-by clauses to track more data points in the lookup. All split-by clauses appear as columns in the lookup.
   1. Add a split-by clause of IDS_Attacks.ids_type and rename it as ids_type to monitor the IDS type in the lookup.
   2. Add a split-by clause to rename IDS_Attacks.signature as signature.
   3. Add a split-by clause to rename IDS_Attacks.vendor_product as vendor_product.
20. Click Next.
21. Select a retention period that defines the age of the data to be stored in the lookup. For example, you want to keep 5 years of IDS attack evidence stored in this lookup. Select a time field of lastTime to base the retention on the last time an attack was identified by the IDS. Type an earliest time
of -5y and indicate the format of the time value that you entered: %s. You can find guidance on the time format in the Splunk platform documentation.

♦ For Splunk Enterprise, see Date and time format variables in the Splunk Enterprise Search Reference manual.
♦ For Splunk Cloud, see Date and time format variables in the Splunk Cloud Search Reference manual.

22. Click Next.
23. Review the search created by the wizard and click Done to finish using the guided search editor.
24. Click Save to save the search.

Modify a search-driven lookup

Since a search-driven lookup contains the two knowledge objects of search and lookup, there are two ways to modify it. Both ways will open the search-driven lookup editor.

Modify the search-driven lookup as follows:

1. From the Splunk Enterprise Security menu bar, select Configure > Content > Content Management.
2. Select a Type of Search-Driven Lookup.
3. Click the lookup that you want to edit.
4. Make changes and click Save.

Modify the lookup generating search as follows:

1. From the Splunk Enterprise Security menu bar, select Configure > Content > Content Management.
2. Select a Type of Lookup Generating Search.
3. Click the lookup that you want to edit.
4. Make changes and click Save.

Enable or disable the search populating a search-driven lookup

You can enable or disable the search of a search-driven lookup to prevent the search from updating the lookup. If you disable the search that populates a search-driven lookup, the search stops updating the lookup and the data in the
lookup will stop being updated. Correlation searches or dashboards that rely on the data inside the lookup will be out-of-date.

1. Select **Configure > Content > Content Management**.
2. Filter on a type of search-driven lookup and open the search-driven lookup that you want to enable or disable.
3. Find the **Search name** of the search-driven lookup.
4. From the Splunk platform menu bar, select **Settings > Searches, reports, alerts**.
5. (Optional) Filter by Type and App of **All**.
6. Find the search and enable or disable it.

Create and manage swim lane searches in Splunk Enterprise Security

Create a swim lane search to create a swim lane that you can add to the Asset Investigator or Identity Investigator dashboard. Swim lanes on the investigator dashboards help you profile activity by a specific asset or identity over time.

1. From the Enterprise Security menu bar, select **Configure > Content > Content Management**.
2. Click **Create New Content** and select **Swim Lane Search**.
3. Type a **Search Name**.
4. Select a **Destination App**.
5. Type a **Title** for the swim lane that appears on the dashboard.
6. Type a **Search** that populates the swim lane.
7. Type a **Drilldown Search** that runs when a user clicks a swim lane item.
   By default, the swim lane item drilldown shows the raw events.
8. Select a color.
9. Select an **Entity Type** of **Asset** or **Identity**.
10. Type **Constraint Fields**. Type a field to specify constraints on the search. Your search must contain **where $constraints$** to use these constraint fields in the search. Only specific constraints are valid for each type of swim lane search.
    For example, an Asset Investigator swim lane search using the Malware data model and the Malware_Attacks data model dataset could specify the **Malware_Attacks.user** field as a constraint.
11. Click **Save**.
Example

For example, create a swim lane to identify all authentication events involving a specific asset.

1. Type a **Search Name** of Authentication by Asset - Example
2. Select a **Destination App** of DA-ESS-AccessProtection.
3. Type a **Title** for the swim lane that appears on the dashboard. All Authentication.
4. Type a **Search** that populates the swim lane.

```
| tstats `summariesonly` values(Authentication.action) as action,values(Authentication.app) as app,values(Authentication.src) as src,values(Authentication.dest) as dest,values(Authentication.user) as user,count from datamodel=Authentication.Authentication where $constraints$ by _time span=$span$
```
5. Type a **Drilldown Search**.

```
| `datamodel("Authentication","Authentication")` | search $constraints$
```
6. **Select the color Purple**.
7. Select an entity type of **Asset** because you want to investigate all authentication events by asset and be able to add this swim lane to the Asset Investigator dashboard. With this specified, all constraints specified as constraint fields perform a reverse lookup against the other fields that identify an asset.
8. Type constraint fields of **Authentication.src** and **Authentication.dest** to identify authentications originating from or targeting a specific asset.

Assuming an asset lookup entry with an IP address of 1.2.3.4, dns of server.example.com, and nt_host of server1, the search for this swim lane searches for all authentication events where the source or destination of the authentication event is 1.2.3.4, server.example.com, or server1.

```
... Authentication.src=1.2.3.4 OR Authentication.src=server.example.com OR Authentication.src=server1 OR Authentication.dest=1.2.3.4 OR Authentication.dest=server.example.com OR Authentication.dest=server1
```

Create and manage views in Splunk Enterprise Security

Create a new view or dashboard using Simple XML from Content Management.
Prerequisite

Creating new views and dashboards from Content Management requires familiarity with Simple XML. For an overview of building and editing dashboards, including working with Simple XML, see the Splunk platform documentation.

- For Splunk Enterprise, see Dashboard overview in Splunk Enterprise Dashboards and Visualizations.
- For Splunk Enterprise, see Dashboard overview in Splunk Enterprise Dashboards and Visualizations.

Task

1. From the Enterprise Security menu bar, select Configure > Content > Content Management.
2. Click Create New Content and select View.
3. Create a new dashboard with Simple XML.
4. Modify the permissions to share the new view with Enterprise Security so that you can view and manage it in Enterprise Security.
   1. From the Splunk bar, select Settings > User interface > Views.
   2. Locate the View name that you created.
   3. Click Permissions and modify the permissions to share the view with Enterprise Security.
   4. Click Save.

You can also create a new dashboard with the interactive dashboard editor. Select Search > Dashboards to open the Dashboards page. You can find information about the Dashboard Editor in the Splunk platform documentation.

- For Splunk Enterprise, see Open the Dashboard Editor in Splunk Enterprise Dashboards and Visualizations.
- For Splunk Cloud, see Open the Dashboard Editor in Splunk Cloud Dashboards and Visualizations.

Use the Navigation editor to change which dashboards are visible on the menu in your deployment. For more information, see Customize the menu bar in Splunk Enterprise Security.

Export content from Splunk Enterprise Security as an app
Export content from Splunk Enterprise Security as an app from the Content Management page. Use the export option to share custom content with other ES instances, such as migrating customized searches from a development or testing environment into production. You can export any type of content on the Content Management page, such as correlation searches, glass tables, data models, and views.

By default, only admin users can export content. To add the export capability to another role, see Adding capabilities to a role in the Installation and Upgrade Manual.

1. From the ES menu bar, select Configure > Content > Content Management.
2. Select the check boxes of the content you want to export.
3. Click Edit Selection and select Export.
4. Type an App name. This will be the name of the app in the file system. For example, SOC_custom.
5. Select an App name prefix. If you want to import the content back into Splunk Enterprise Security without modifying the default app import conventions, select DA-ESS-. Otherwise, select No Prefix.
6. Type a Label. This is the name of the app. For example, Custom SOC app.
7. Type a Version and Build number for your app.
8. Click Export.
9. Click Download app now to download the app package to the search head at the location $SPLUNK_HOME/etc/apps/SA-Utils/local/data/appmaker/*. 
10. Click Close to return to Content Management.

Limitations to exported content

Exported content may not work on older versions of Enterprise Security. The following items are included or not included in exported content.

<table>
<thead>
<tr>
<th>Exported item</th>
<th>Included in export</th>
<th>Not included in export</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data models</td>
<td>datamodels.conf and data model JSON definition.</td>
<td>N/A</td>
</tr>
<tr>
<td>Saved searches, including correlation, key indicator, and swim lane</td>
<td>savedsearches.conf governance.conf Alert actions and response actions, including risk assignments, script names, and</td>
<td>Macros, script files, lookups, or any binary files referenced by the search object. Extreme Search objects, such as</td>
</tr>
</tbody>
</table>
Create and manage lookups in Splunk Enterprise Security

Splunk Enterprise Security provides lookups to manage asset and identity correlation with events, match threat indicators with events, and enrich dashboards and panels with information.

As an administrator, you can add lookups to Splunk Enterprise Security. After you add lookups to Splunk Enterprise Security, you can use the lookups in searches, edit them, add descriptions, and export them.

**Add a lookup to Splunk Enterprise Security**

Upload and create a lookup in Splunk Enterprise Security.

1. Select **Configure > Content > Content Management**.
2. Click **Create New Content > Managed Lookup**.
3. Click **Create New**.
4. Select a lookup file to upload.
5. (Optional) Change the default **App** for the file.
6. (Optional) Modify the file name.
7. (Optional) Modify the definition name.
8. (Optional) Change the default lookup type.
9. Type a label for the lookup. The label appears as the name for the lookup on the Content Management page.
10. Type a description for the lookup.
11. (Optional) Change the option to allow editing of the lookup file.
12. Click Save.

Add an existing lookup to Splunk Enterprise Security

If the lookup file and definition already exists in the Splunk platform, you can add it to Splunk Enterprise Security so that you can edit it.

1. Select Configure > Content > Content Management.
2. Click Create New Content > Managed Lookup.
3. Click Select Existing.
4. Select the lookup definition from the drop-down list.
5. (Optional) Modify the lookup type.
6. Type a label for the lookup. The label appears as the name for the lookup on the Content Management page.
7. Type a description for the lookup.
8. (Optional) Change the option to allow editing of the lookup file.
9. Click Save.

Verify that you added a lookup successfully

Confirm that you added a lookup file successfully by using the inputlookup search command to display the list. For example, to review the application protocols lookup:

```
| inputlookup append=T application_protocol_lookup
```

Edit a lookup in Splunk Enterprise Security

Only users with appropriate permissions can edit lookups. See Manage permissions in Splunk Enterprise Security. Lookups do not accept regular expressions, and the lookup editor does not validate the accuracy of your entries. You cannot save a lookup file with empty header fields.
Stop managing a lookup

You can stop managing a lookup on the Content Management page by clicking Stop managing. When you stop managing a lookup, you can no longer edit the lookup from Splunk Web but the lookup is not deleted.

Export a lookup in Splunk Enterprise Security

1. On Content Management, locate the lookup that you want to export.
2. Under the Actions column, click Export to export a copy of the file in CSV format.

You can export multiple lookup files and other knowledge objects as part of an app. See Export content from Splunk Enterprise Security as an app in Administer Splunk Enterprise Security.

Audit changes made to lookup files

To review the last time a lookup file was edited and by whom, use a search. For example:

```
index=_internal
```

Manage internal lookups in Splunk Enterprise Security

Splunk Enterprise Security provides and maintains internal lookups to support dashboards, searches, and other internal processes.

These lookups are created in several ways.

- Populated by a static lookup table
- Populated internally by search commands, called a search-driven lookup
- Populated with information from the Internet

The internal lookups populated with information from the Internet are used by some correlation searches to identify hosts that are recognized as malicious or suspicious according to various online sources, such as the SANS Institute. If Splunk Enterprise Security is not connected to the Internet, these lookup files are not updated and the correlation searches that rely on the lookups might not
function correctly. Most of the internal lookups populated by the Internet are threat intelligence sources. See Configure the threat intelligence sources included with Splunk Enterprise Security in this manual.

Select Configure > Content > Content Management to view the existing lookups that you can edit in Splunk Enterprise Security.

Splunk Enterprise Security uses the internal lookups in different ways.

<table>
<thead>
<tr>
<th>Lookup type</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>List</td>
<td>Small, relatively static lists used to enrich dashboards.</td>
<td>Categories</td>
</tr>
<tr>
<td>Asset or identity list</td>
<td>Maintained by a modular input and searches. See How Splunk Enterprise Security processes and merges asset and identity data.</td>
<td>Assets</td>
</tr>
<tr>
<td>Threat intelligence collections</td>
<td>Maintained by several modular inputs. See Threat intelligence framework in Splunk ES on the Splunk developer portal.</td>
<td>Local Certificate Intel</td>
</tr>
<tr>
<td>Tracker</td>
<td>Search-driven lookups used to supply data to dashboard panels.</td>
<td>Malware Tracker</td>
</tr>
<tr>
<td>Per-panel filter lookup</td>
<td>Used to maintain a list of per-panel filters on specific dashboards.</td>
<td>HTTP Category Analysis Filter</td>
</tr>
</tbody>
</table>

Internal lookups that you can modify

Some lookups are managed by searches (search-driven lookups), and others you update manually. This table lists the lookups that you might need to modify in Splunk Enterprise Security.

<table>
<thead>
<tr>
<th>Lookup name</th>
<th>Type</th>
<th>Description</th>
<th>Usage details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action History Search Tracking Whitelist</td>
<td>List</td>
<td>Add searches to this whitelist to prevent them from creating action history items for investigations.</td>
<td>Type a start_time of 1 to whitelist the search. Type a start_time and an end_time to whitelist the search for a specific period of time.</td>
</tr>
</tbody>
</table>

List
### Administrative Identities

You can use this lookup to identify privileged or administrative identities on relevant dashboards such as the Access Center and Account Management dashboards.

Modify the **category** column to indicate the privileged status of an account. Specify privileged default accounts with `default|privileged`, or `type privileged` for privileged accounts that are not default accounts, or `default` for default accounts that are not privileged.

<table>
<thead>
<tr>
<th>Lookup name</th>
<th>Type</th>
<th>Description</th>
<th>Usage details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Protocols</td>
<td>List</td>
<td>Used by the Port and Protocol dashboard.</td>
<td>See Application Protocols.</td>
</tr>
<tr>
<td>Asset/Identity Categories</td>
<td>List</td>
<td>You can use this to set up categories to use to organize an asset or identity. Common categories for assets include compliance and security standards such as PCI or functional categories such as server and web_farm. Common categories for identities include titles and roles.</td>
<td>See Asset/Identity Categories.</td>
</tr>
<tr>
<td>Assets</td>
<td>Asset list</td>
<td>You can manually add assets in your environment to this lookup to be included in the asset lookups used for asset correlation.</td>
<td>See Manually add static asset or identity data.</td>
</tr>
<tr>
<td>Demonstration Assets</td>
<td>Asset list</td>
<td>Provides sample asset data for demonstrations or examples.</td>
<td>Disable the lookup for use in production environments. See Disable the demo asset and identity lookups.</td>
</tr>
<tr>
<td>Lookup name</td>
<td>Type</td>
<td>Description</td>
<td>Usage details</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Demonstration Identities</td>
<td>Identity list</td>
<td>Provides sample identity data for demonstrations or examples.</td>
<td>Disable the lookup for use in production environments. See Disable the demo asset and identity lookups.</td>
</tr>
<tr>
<td>ES Configuration Health Filter</td>
<td>Per-panel filter lookup</td>
<td>Per-panel filtering for the ES Configuration Health dashboard.</td>
<td>See Configure per-panel filtering in Splunk Enterprise Security.</td>
</tr>
<tr>
<td>Expected Views</td>
<td>List</td>
<td>Lists Enterprise Security views for analysts to monitor regularly.</td>
<td>See Expected Views.</td>
</tr>
<tr>
<td>HTTP Category Analysis Filter</td>
<td>Per-panel filter lookup</td>
<td>Per-panel filtering for the HTTP Category Analysis dashboard</td>
<td>See Configure per-panel filtering in Splunk Enterprise Security.</td>
</tr>
<tr>
<td>HTTP User Agent Analysis</td>
<td>Per-panel filter lookup</td>
<td>Per-panel filtering for the HTTP User Agent Analysis dashboard</td>
<td>See Configure per-panel filtering in Splunk Enterprise Security.</td>
</tr>
<tr>
<td>Identities</td>
<td>Identity list</td>
<td>You can manually edit this lookup to add identities to the identity lookup used for identity correlation.</td>
<td>See Manually add static asset or identity data.</td>
</tr>
<tr>
<td>IIN Lookup</td>
<td>List</td>
<td>Static list of Issuer Identification Numbers (IIN) used to identify likely credit card numbers in event data.</td>
<td>Used to detect Personally-Identifiable Information (PII) in your events.</td>
</tr>
<tr>
<td>Interesting Ports</td>
<td>List</td>
<td>Used by correlation searches to identify ports that are relevant to your network security policy.</td>
<td>See Interesting Ports.</td>
</tr>
<tr>
<td>Interesting Processes</td>
<td>List</td>
<td>Used by a correlation</td>
<td>See Interesting Processes.</td>
</tr>
<tr>
<td>Lookup name</td>
<td>Type</td>
<td>Description</td>
<td>Usage details</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Processes</td>
<td></td>
<td>search to identify processes running on hosts relevant to your security policy.</td>
<td></td>
</tr>
<tr>
<td>Interesting Services</td>
<td>List</td>
<td>Used by a correlation search to identify services running on hosts relevant to your security policy.</td>
<td>See Interesting Services.</td>
</tr>
<tr>
<td>Local * Intel</td>
<td>Threat intelligence lookup</td>
<td>Used to manually add threat intelligence.</td>
<td>See Add and maintain threat intelligence locally in Splunk Enterprise Security.</td>
</tr>
<tr>
<td>Modular Action Categories</td>
<td>List</td>
<td>Used to categorize the types of adaptive response actions available to select.</td>
<td>Add a custom category to categorize a custom adaptive response action on Incident Review or the correlation search editor.</td>
</tr>
<tr>
<td>New Domain Analysis</td>
<td>Per-panel filter lookup</td>
<td>Per-panel filtering for the New Domain Analysis dashboard.</td>
<td>See Configure per-panel filtering in Splunk Enterprise Security.</td>
</tr>
<tr>
<td>PCI Domain Lookup</td>
<td>Identity list</td>
<td>Used by the Splunk App for PCI Compliance to enrich the <code>pci_domain</code> field.</td>
<td>See Set up asset categories.</td>
</tr>
<tr>
<td>Primary Functions</td>
<td>List</td>
<td>Identifies the primary process or service running on a host. Used by a correlation search.</td>
<td>See Primary Functions.</td>
</tr>
<tr>
<td>Prohibited Traffic</td>
<td>List</td>
<td>Identifies process and service traffic prohibited in your environment. Used by a correlation search.</td>
<td>See Prohibited Traffic.</td>
</tr>
<tr>
<td>Lookup name</td>
<td>Type</td>
<td>Description</td>
<td>Usage details</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Risk Object Types</td>
<td>List</td>
<td>The types of risk objects available.</td>
<td>Edit the lookup to create a custom risk object type. You can then filter on the new risk object type or add a new risk entry on the Risk Analysis dashboard. See Create risk and edit risk objects in Splunk Enterprise Security.</td>
</tr>
<tr>
<td>Security Domains</td>
<td>List</td>
<td>Lists the security domains that you can use to categorize notable events when created and on Incident Review.</td>
<td>Edit the lookup and add a custom security domain.</td>
</tr>
<tr>
<td>Threat Activity Filter</td>
<td>Per-panel filter lookup</td>
<td>Per-panel filtering for the Threat Activity dashboard.</td>
<td>See Configure per-panel filtering in Splunk Enterprise Security.</td>
</tr>
<tr>
<td>Urgency Levels</td>
<td>List</td>
<td>Urgency Levels contains the combinations of priority and severity that dictate the urgency of notable events.</td>
<td>See How urgency is assigned to notable events in Splunk Enterprise Security in Use Splunk Enterprise Security.</td>
</tr>
<tr>
<td>URL Length Analysis</td>
<td>Per-panel filter lookup</td>
<td>Per-panel filtering for the URL Length Analysis dashboard.</td>
<td>See Configure per-panel filtering in Splunk Enterprise Security.</td>
</tr>
</tbody>
</table>

**Application Protocols**

The Application Protocols list is a list of port and protocol combinations and their approval status in your organization. This list is used by the Port & Protocol Tracker dashboard. See Port & Protocol Tracker dashboard.
The following fields are available in this file.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dest_port</td>
<td>The destination port number. Must be a number from 0 to 65535.</td>
</tr>
<tr>
<td>transport</td>
<td>The protocol of the network traffic. For example, icmp, tcp, or udp.</td>
</tr>
<tr>
<td>app</td>
<td>The name of the application using the port.</td>
</tr>
</tbody>
</table>

**Asset/Identity Categories**

The category list can contain any set of categories you choose for organizing an asset or an identity. A category is a logical classification or grouping used for assets and identities. Common choices for assets include compliance and security standards such as PCI, or functional categories such as server and web_farm. Common choices for identities include titles and roles. For more examples, see Format an asset or identity list as a lookup in Splunk Enterprise Security.

To enrich events with category information in asset and identity correlation, you must maintain the category field in the asset and identity lists instead of in the Asset/Identity Categories list. See Format an asset or identity list as a lookup in Splunk Enterprise Security.

There are two ways to maintain the Asset/Identity Categories list.

**Run a saved search to maintain a list of categories**

Splunk Enterprise Security includes a saved search that takes categories defined in the asset and identity lists and adds them to the Asset/Identity Categories list. The search is not scheduled by default.

1. From the Splunk platform menu bar, select Settings > Searches, reports, alerts.
2. Locate the Identity - Make Categories - Lookup Gen search-driven lookup or lookup generating search.
3. Click Edit > Enable.

**Manually maintain a list of categories**

Maintain the Categories list manually by adding categories to the lookup directly. By default, you must maintain the list manually.

1. Select Configure > Content > Content Management.
2. Click the **Asset/Identity Categories** list.
3. Add new categories to the list.
4. Click **Save**.

**Expected Views**

The Expected Views list specifies Splunk Enterprise Security views that are monitored on a regular basis. The View Audit dashboard uses this lookup. See View Audit for more about the dashboard.

The following table describes the fields in this file.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>app</td>
<td>The application that contains the view. This is usually set to SplunkEnterpriseSecuritySuite.</td>
</tr>
<tr>
<td>is_expected</td>
<td>Either &quot;true&quot; or &quot;false&quot;. If not specified, Splunk Enterprise Security assumes by default that the view is not expected to be monitored.</td>
</tr>
<tr>
<td>view</td>
<td>The name of the view. Available in the URL or on the Content Management dashboard.</td>
</tr>
</tbody>
</table>

To find the name of a view:

1. Navigate to the view in Enterprise Security.
2. Look at the last segment of the URL to find the view name.

For example, the view in the following URL below is named `incident_review`:


**Interesting Ports**

Interesting Ports contains a list of TCP and UDP ports determined to be required, prohibited, or insecure in your deployment. Administrators can set a policy defining the allowed and disallowed ports and modify the lookup to match that policy. To get alerts when those ports are seen in your environment, enable the correlation search that triggers an alert for those ports, such as Prohibited Port Activity Detected.

The following table describes the fields in this file.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>Description</td>
<td>Example</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>app</td>
<td>The application or service name using the port.</td>
<td>Win32Time</td>
</tr>
<tr>
<td>dest</td>
<td>The destination host for the network service. Use a wildcard * to match all hosts.</td>
<td>DARTH*, 10.10.1.100, my_host.</td>
</tr>
<tr>
<td>dest_pci_domain</td>
<td>An optional PCI domain. Accepts a wildcard.</td>
<td>trust, untrust</td>
</tr>
<tr>
<td>dest_port</td>
<td>The destination port number. Accepts a wildcard.</td>
<td>443, 3389, 5900</td>
</tr>
<tr>
<td>transport</td>
<td>The transport protocol. Accepts a wildcard.</td>
<td>tcp or udp</td>
</tr>
<tr>
<td>is_required</td>
<td>If you require the service to be running, and want the correlation search to create an alert if it is not running, set to true.</td>
<td>true or false</td>
</tr>
<tr>
<td>is_prohibited</td>
<td>If you do not want the port to be used in your network, and want the correlation search to create an alert if it is in use, set to true.</td>
<td>true or false</td>
</tr>
<tr>
<td>is_secure</td>
<td>If the traffic sent through the port is secure, set to true.</td>
<td>true or false</td>
</tr>
<tr>
<td>note</td>
<td>Describe the service using the port and the explanation for the port policy.</td>
<td>Unencrypted telnet services are insecure.</td>
</tr>
</tbody>
</table>

**Interesting Processes**

Interesting Processes contains a list of processes and whether you consider the processes required, prohibited, or secure to be running in your environment. Splunk Enterprise Security uses this list in the Prohibited Process Detected correlation search.

The following table describes the fields in this file.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>app</td>
<td>Application name</td>
</tr>
<tr>
<td>dest</td>
<td>Destination of the process</td>
</tr>
</tbody>
</table>
Interesting Services

Interesting Services contains a list of services in your deployment. The correlation search Prohibited Service Detected uses this lookup to determine whether a service is required, prohibited, and/or secure.

The following table describes the fields in this file.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>app</td>
<td>Application name</td>
</tr>
<tr>
<td>dest</td>
<td>Destination host that the service is running on.</td>
</tr>
<tr>
<td>dest_pci_domain</td>
<td>PCI domain of the host, if available</td>
</tr>
<tr>
<td>is_required</td>
<td>If the service is required to be running on the host, set to true. Possible values are true or false.</td>
</tr>
<tr>
<td>is_prohibited</td>
<td>If the service is prohibited from running on the host, set to true. Possible values are true or false.</td>
</tr>
<tr>
<td>is_secure</td>
<td>If the service is secure, set to true. Possible values are true or false.</td>
</tr>
<tr>
<td>note</td>
<td>Any additional information about this service.</td>
</tr>
</tbody>
</table>

Primary Functions

Primary Functions contains a list of primary processes and services and their function in your deployment. Use this list to define which services are primary and the port and transport to be used by the services. This lookup is used by the Multiple Primary Functions Detected correlation search.
The following table describes the fields in this file.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>process</td>
<td>Name of the process</td>
</tr>
<tr>
<td>service</td>
<td>Name of the service</td>
</tr>
<tr>
<td>dest_pci_domain</td>
<td>PCI domain of the destination host, if available</td>
</tr>
<tr>
<td>transport</td>
<td>Protocol used for transport by the process. Possible values are tcp or udp.</td>
</tr>
<tr>
<td>port</td>
<td>The port number used by the process.</td>
</tr>
<tr>
<td>is_primary</td>
<td>If the process is the primary process on the host, set to true. Possible values are true or false.</td>
</tr>
<tr>
<td>function</td>
<td>The function that the process performs. For example, proxy, authentication, database, Domain Name Service (DNS), web, or mail.</td>
</tr>
</tbody>
</table>

**Prohibited Traffic**

Prohibited Traffic lists processes that, if seen in your network traffic, could indicate malicious behavior. This list is used by the System Center dashboard and is useful for detecting software that is prohibited by your security policy, such as IRC, data destruction tools, file transfer software, or known malicious software, such as malware that was recently implicated in an outbreak.

The following table describes the fields in this file.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>app</td>
<td>The name of the process (such as echo, chargen, etc.)</td>
</tr>
<tr>
<td>is_prohibited</td>
<td>If the process is prohibited in your environment, set to true. Possible values are true or false.</td>
</tr>
<tr>
<td>note</td>
<td>Add a description about why the process is prohibited.</td>
</tr>
</tbody>
</table>

**Create risk and edit risk objects in Splunk Enterprise Security**

As an ES Admin, you can create and edit risk objects.
Create a new risk object

1. From the Enterprise Security menu, select Configure > Content > Content Management.
2. From the Type drop-down filter, select Lookup.
3. (Optional) In the Search filter, type risk object types.
4. Select the Risk Object Types list.
5. Highlight the last risk_object_type cell in the table and right-click to see the table editor.
6. Insert a new row into the table.
7. Double-click in the new row to edit it, then add the new object type name.
8. Save the changes.

Edit an existing risk object

1. From the Enterprise Security menu, select Configure > Content > Content Management.
2. From the Type drop-down filter, select Lookup.
3. (Optional) In the Search filter, type risk object types.
4. Select the Risk Object Types list.
5. Highlight the risk object type and change the name.
6. Save the changes.

Expand Content Management searches to view dependency and usage information in Splunk Enterprise Security

In Content Management, it is possible to see more details about the knowledge objects such as data models, correlation searches, lookups, investigations, key indicators, glass tables, and reports.

Additional details

With these additional details, you can verify health status, statistics, associated knowledge objects, and that the proper technical add-ons are populating within each of objects.

1. From the Splunk ES menu bar, select Configure > Content > Content Management.
2. (Optional) From the Type filter, select a type such as **Search** or **Data Model**.

3. From the event information column of a search or data model, click the greater than (>) symbol to expand the display.

   Not every Type will include the greater than (>) symbol, and each different Type will show different details.

The following table describes the additional usage details and dependencies:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
<td>Icon to show the overall health. If the icon is not a green checkmark, then you are not ingesting enough data for this content to report accurately.</td>
</tr>
<tr>
<td><strong>Statistics</strong></td>
<td>For searches, if the saved search is scheduled, this shows execution statistics from the _audit index. For data models, if the data model is accelerated, the execution statistics are also returned for the acceleration search.</td>
</tr>
<tr>
<td><strong>Associated Searches</strong></td>
<td>The saved searches that use this object or dataset.</td>
</tr>
<tr>
<td><strong>Associated Panels</strong></td>
<td>The panels that use this object or dataset.</td>
</tr>
<tr>
<td><strong>Indexes</strong></td>
<td>The indexes that this object or dataset uses. If the icon is a green checkmark, then the index has events for the past 24 hours.</td>
</tr>
<tr>
<td><strong>Lookups</strong></td>
<td>The lookups that this object or dataset uses. If the icon is a green checkmark, then the row counts for the csv or kvstore lookup files are not empty.</td>
</tr>
<tr>
<td><strong>Sourcetypes</strong></td>
<td>The sourcetypes that this object or dataset uses. For example, if you have Unix in your environment and you would expect to see that sourcetype listed here, but you don't see it, then you would know that you need to revise the way you're getting that data into Splunk. If the icon is a green checkmark, then the index has events for the past 24 hours.</td>
</tr>
<tr>
<td><strong>Tags</strong></td>
<td>The tags that this object or dataset uses.</td>
</tr>
</tbody>
</table>

Associated objects are only visible if there is data to populate them. If there is no data to populate them, then you will see a message such as "No associated objects or datasets found."
Use Analytic Stories through the use case library in Splunk Enterprise Security

The Splunk Security Research team writes Analytic Stories that provide actionable guidance for detecting, analyzing, and addressing security threats. An Analytic Story contains the searches you need to implement the story in your own Splunk Enterprise Security (ES) environment. It also provides an explanation of what the search achieves and how to convert a search into adaptive response actions, where appropriate.

The Splunk Enterprise Security Content Update (ESCU) delivers Analytic Stories to customers as part of a content subscription service. Analytic Stories give you advice on how to use Splunk ES to investigate and take action on new threats that Splunk ES detects in your environment.

The ESCU Analytic Story content is available directly in Splunk ES through the use case library. If you do not have ESCU installed, you will see some Analytic Stories by default as well as a message prompting you to download and install the ESCU add-on for access to common security Analytic Stories. When new Analytic Stories are published in newer versions of ESCU, you need to upgrade the ESCU add-on to get the new content.

Prerequisites for using the use case library include the following:

- Data is ingested via your forwarders and technical add-ons.
- The CIM add-on is installed.
- (Optional) The ESCU add-on is installed so you can access more Analytic Stories.

You can explore, activate, bookmark, and configure common searches in the use case library.

Determine which Analytic Stories to use

You can use common industry use cases to determine which Analytic Stories and searches are useful to you. There are a variety of ways to determine if an Analytic Story contains the searches you need:

- by industry use case
- by framework
- by data
In the following scenario, you know that you’re interested in common AWS-related security issues, so you start by filtering on known use cases for cloud security.

1. From the Splunk ES menu bar, select **Configure > Content > Use Case Library**.
2. From the use cases filters on the left, click **Cloud Security**.
3. From an Analytic Story, such as Suspicious AWS EC2 Activities, click the greater than (>) symbol to expand the display.
4. You will see the detection searches that are related to this use case.
5. You will also see your data sources, data models, and lookups that these searches use.

<table>
<thead>
<tr>
<th>Data Sources</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Data Sources</td>
<td>The type of data sources that are likely to provide valuable data.</td>
</tr>
<tr>
<td>Sourcetypes</td>
<td>Your sourcetypes that are in use by the detection searches for this Analytic Story. If the status icon shows a red exclamation mark, hover over the icon to see the reason.</td>
</tr>
<tr>
<td>Data Models</td>
<td>Your data that is in use by the detection searches for this Analytic Story as mapped to the Splunk data models via the CIM add-on. If the status icon shows a red exclamation mark, hover over the icon to see the reason.</td>
</tr>
<tr>
<td>Lookups</td>
<td>Your lookups that are in use by the detection searches for this Analytic Story. If the status icon shows a red exclamation mark, hover over the icon to see the reason.</td>
</tr>
</tbody>
</table>

6. Click the name of the Analytic Story. In this case, click **Suspicious AWS EC2 Activities**.
   The Analytic Story Details page opens for the story.
7. You will see the searches related to the stages of detecting, investigating, assessing, and mitigating issues.
   1. From the Detection section, select a search, such as **ESCU - EC2 Instance Started In Previously Unseen Region**.
   2. From the Search section, click the greater than (>) symbol to expand the display.
   3. Revise the time picker and click **Search**.
4. From the How to Implement section, click the greater than (>) symbol to expand the display for tips on implementation.
5. From the Known False Positives section, click the greater than (>) symbol to expand the display for tips on when the results might not indicate a problem.

If you want to run this search automatically on a regular basis, see Enable and schedule the Analytic Story.

Enable and schedule the Analytic Story

Once you determine that an Analytic Story will help you detect, investigate, assess, or mitigate an issue, you can enable and schedule it. An Analytic Story is considered "in use" when at least one search is enabled and scheduled. By default, all stories are disabled. If a search is enabled but not scheduled, or if it is run manually, then it is not considered in use.

1. From the Splunk ES menu bar, select Configure > Content > Use Case Library.
2. From the event information column, click the greater than (>) symbol to expand the display.
   1. Click the name of an ESCU detection search.
      A new content management window opens.
   2. Click Enable.
3. To edit the correlation search schedule, click the name of the search.
4. Click Save.

To modify correlation searches in your environment, see Create correlation searches in Splunk Enterprise Security.

Bookmark the Analytic Story

Bookmarks persist per user, so individual analysts can bookmark the Analytic Stories that are specific to their duties.

1. From the Splunk ES menu bar, select Configure > Content > Use Case Library.
2. Find the name of the Analytic Story.
3. Toggle the **Bookmark** switch to enable it.
4. From the drop-down filters, select **Bookmarked > True** to find your bookmarked stories.

**Configure the library**

You can revise how the preconfigured use case library displays your most frequently used Analytic Stories and searches.

The use case library does not require any special capability to view Analytic Stories, but it does require the `edit_analyticstories` capability to edit and add them. By default, ES assigns the `edit_analyticstories` capability to the `ess_admin` and `ess_analyst` roles. An admin can assign other roles from the Permissions setting.

**Edit or add Analytic Story details**

To edit the displayed descriptions, narratives, references, or searches:

1. From the Splunk ES menu bar, select **Configure > Content > Use Case Library**.
2. From the use case library, click the name of an Analytic Story to see the Analytic Story Details page, which contains all the default information that is provided by the ESCU content.
3. From the top-right of the Analytic Story Details page, click **Edit**.
4. A new browser window opens so you can change the story descriptions, narratives, or references to fit your specific usage. These changes are global, not per user, so everyone sees the same updates.
5. You can also add existing searches that do not display by default in this Analytic Story.
   1. Scroll to the Searches section.
   2. Click **Add Search**.
   3. Select the search to include in this story.
6. Click **Save**.

**Search types**

When you add a search in the Edit Analytic Stories window, the type of search appears to the right of the search name. By default you will see detection, investigative, contextual, support, or select to annotate.
Only annotated searches are associated with an Analytic Story. When you add an annotated search, the search is immediately added to the Analytic Story. In those added searches, you can click **Edit Search** to revise the annotations of that search.

If the search is not annotated, do the following to annotate it:

1. From the right side of the search name, click **Select to annotate**.
2. In the annotation editor, type the name of an existing search type or type the name a new search type in the Type field. This is the only mandatory field.
3. (Optional) If you want analysts to see information when deciding which stories and searches to use, fill in information for Description, How to Implement, Known False Positives, Providing Technologies (also known as data sources or technology add-ons).
4. (Optional) In the Annotations field, click **Add row** to add Framework names and their Mapping categories. These are free-form fields. You can use them for either industry-standard frameworks, such as National Institute of Standards and Technology issues for detecting and continuous monitoring of vulnerabilities (NIST + DE.CM), or you can use them for frameworks of your own.
   You can find these later from the Framework Mapping filter.
   1. From the Splunk ES menu bar, select **Configure > Content > Use Case Library**.
   2. From the drop-down filters, click **Framework Mapping**.
   3. Type the name of a Framework or scroll to find it.
   4. Click the check box to select a Framework. The filter is using OR logic, so the more check boxes you select, the more results you will see.
The `savedsearches.conf` file is used to annotate existing saved searches.

**Create an Analytic Story**

You can create your own Analytic Story and map it to the searches of your choice.

The use case library does not require any special capability to view Analytic Stories, but requires the `edit_analyticstories` capability to edit and create new ones. By default, ES assigns the `edit_analyticstories` capability to the `ess_admin` and `ess_analyst` roles. An admin can assign it to other roles from the Permissions setting.

1. From the Splunk ES menu bar, select **Configure > Content > Content Management**.
2. Click **Create New Content > Analytic Story**.
3. Fill in the required fields to create your analytics story.
4. Scroll down to the **Searches** field.
5. From the Add Search drop-down menu, you can select any of the searches that have been annotated.
6. Click **Save**.

**Install Analytic Stories from other apps**

While ESCU content is imported automatically, you can also import Analytic Stories from apps other than ESCU into the use case library.

Install the app to see the Analytic Stories in the use case library.

1. Install the app onto the same search head as Splunk ES.
2. Export the app to other apps or globally.
3. Review the new knowledge objects. If the Analytic Stories are visible in the use case library, the export is successful.
4. Use the new Analytic Stories.

If you do not see the new Analytic Stories in the use case library, it's because of one of the following reasons:

- Make sure that the app is being exported globally. See Make Splunk knowledge objects globally available in the Splunk Enterprise *Admin Manual*.
- If the app does not contain compatible use cases, it does not contain an `analyticstory.conf` file.
Configuration and Troubleshooting

Configure general settings for Splunk Enterprise Security

As a Splunk Enterprise administrator, you can make configuration changes to your Splunk Enterprise Security installation. Change threshold values, macro definitions, search filters, and other commonly changed values on the General Settings page.

On the Enterprise Security menu bar, select **Configure > General > General Settings**.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Sources</td>
<td>A search macro that enumerates the lookup tables that contain asset information used for asset correlation.</td>
</tr>
<tr>
<td>Auto Pause</td>
<td>Type the time in seconds before a drilldown search will pause.</td>
</tr>
<tr>
<td>Default Watchlist Search</td>
<td>Define the watchlisted events for the 'Watchlisted Events' correlation search</td>
</tr>
<tr>
<td>Domain Analysis</td>
<td>Enable or disable WHOIS tracking for Web domains.</td>
</tr>
<tr>
<td>Domain From URL Extraction Regex</td>
<td>A regular expression used to extract domain (url_domain) from a URL.</td>
</tr>
<tr>
<td>Enable Identity Generation Autoupdate</td>
<td>If true, permit the Identity Manager to auto-update asset_sources, identity_sources, and generate_identities macros. True by default.</td>
</tr>
<tr>
<td>Generic Error Search</td>
<td>A search filter for defining events that indicate an error has occurred.</td>
</tr>
<tr>
<td>HTTP Category Analysis Sparkline Earliest</td>
<td>Set the start time for sparklines displayed on the <strong>HTTP User Category Analysis</strong> dashboard.</td>
</tr>
<tr>
<td>HTTP Category Analysis Sparkline Span</td>
<td>Set the time span for sparklines displayed on the <strong>HTTP User Category Analysis</strong> dashboard.</td>
</tr>
<tr>
<td>HTTP User Agent Analysis Sparkline</td>
<td>Set the start time for sparklines displayed on the <strong>HTTP User Agent Analysis</strong> dashboard.</td>
</tr>
<tr>
<td>Setting</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Earliest</td>
<td></td>
</tr>
<tr>
<td>HTTP User Agent Analysis Sparkline Span</td>
<td>Set the time span for sparklines displayed on the HTTP User Agent Analysis dashboard.</td>
</tr>
<tr>
<td>IRT Disk Sync Delay</td>
<td>Set the number of seconds for Enterprise Security to wait for a disk flush to finish. Relevant to indexed real time searches.</td>
</tr>
<tr>
<td>Identity Generation</td>
<td>Defines the transformations used to normalize identity information. See Rank the order for merging identities.</td>
</tr>
<tr>
<td>Identity Generation Timeout</td>
<td>Number of seconds the Identity Manager waits before warning of slow search completion in identity_manager.log.</td>
</tr>
<tr>
<td>Identity Sources</td>
<td>Enumerates the source lookup tables that contain identity information.</td>
</tr>
<tr>
<td>Incident Review Analyst Capacity</td>
<td>Estimated maximum capacity of notable events assigned to an analyst. Relative measure of analyst workload.</td>
</tr>
<tr>
<td>Indexed Realtime</td>
<td>Enable or disable indexed real-time mode for searches.</td>
</tr>
<tr>
<td>Large Email Threshold</td>
<td>An email that exceeds this size in bytes is considered large.</td>
</tr>
<tr>
<td>Licensing Event Count Filter</td>
<td>Define the list of indexes to exclude from the &quot;Events Per Day&quot; summarization.</td>
</tr>
<tr>
<td>Maximum Documents Per Batch Save (kvstore)</td>
<td>The maximum number of documents that can be saved in a single batch to a KV Store collection.</td>
</tr>
<tr>
<td>New Domain Analysis Sparkline Span</td>
<td>Set the time span for sparklines displayed in the New Domain Analysis dashboard.</td>
</tr>
<tr>
<td>Notable Modalert Pipeline</td>
<td>SPL for the notable event adaptive response action.</td>
</tr>
<tr>
<td>Override Email Alert Action</td>
<td>Override the email alert action settings to allow users to send notable events via email through adaptive response actions on the Incident Review dashboard.</td>
</tr>
<tr>
<td>Risk Modalert Pipeline</td>
<td>SPL for the risk modifier adaptive response action.</td>
</tr>
<tr>
<td>Setting</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Search Disk Quota (admin)</td>
<td>Set the maximum amount of disk space in MB that an admin user can use to store search job results.</td>
</tr>
<tr>
<td>Search Jobs Quota (admin)</td>
<td>Set the maximum number of concurrent searches allowed for admin users.</td>
</tr>
<tr>
<td>Search Jobs Quota (power)</td>
<td>Set the maximum number of concurrent searches for power users.</td>
</tr>
<tr>
<td>Short Lived Account Length</td>
<td>An account creation and deletion record that exceeds this threshold is anomalous.</td>
</tr>
<tr>
<td>TSTATS Allow Old Summaries</td>
<td>Enable or disable searching of data model accelerations containing fields that do not match the current data model configuration.</td>
</tr>
<tr>
<td>TSTATS Local</td>
<td>Determine whether or not the TSTATS macro will be distributed.</td>
</tr>
<tr>
<td>TSTATS Summaries Only</td>
<td>Determine whether or not the TSTATS or summariesonly macro will only search accelerated events.</td>
</tr>
<tr>
<td>Threat Artifacts Max</td>
<td>The maximum number of threat artifacts to return for unfiltered queries on the Threat Artifacts dashboard. The default is 10000, and is managed in the <code>threat_artifacts_max</code> macro editor.</td>
</tr>
<tr>
<td>Threat Intelligence Wildcard Minimum Length</td>
<td>Filter out wildcard intelligence that doesn't meet the minimum requirement.</td>
</tr>
<tr>
<td>Use Other</td>
<td>Enable or disable the term OTHER on charts that exceed default series limits.</td>
</tr>
<tr>
<td>Website Watchlist Search</td>
<td>A list of watchlisted websites used by the &quot;Watchlisted Events&quot; correlation search.</td>
</tr>
</tbody>
</table>

**See also**

- Manage input credentials in Splunk Enterprise Security
- Manage permissions in Splunk Enterprise Security
- Customize the menu bar in Splunk Enterprise Security
- Configure per-panel filtering in Splunk Enterprise Security
Manage credentials in Splunk Enterprise Security

Use the Credential Management page to store credentials for scripted or modular inputs. Input configurations that reference credentials use the credentials stored in Credential Management. You can store credentials such as usernames and passwords, or certificates used for authentication with third-party systems. Do not use this page to manage certificates used to encrypt server-to-server communications.

Your role must have the appropriate capabilities to add, modify, and view credentials and certificates. See Configure users and roles in the Installation and Upgrade Manual.

Add a new credential for an input

1. On the Enterprise Security menu bar, select Configure > General > Credential Management.
2. Click New Credential to add a new user credential.
3. Type a Username.
4. (Optional) Type a Realm field to differentiate between multiple credentials that have the same username.
5. Type the Password for the credential, and type it again in Confirm password.
6. Select the App for the credential.
7. Click Save.

Add a new credential for UBA input

Splunk ES uses a specific local UBA username and password authentication to integrate with Splunk User Behavior Analytics.

1. On the Enterprise Security menu bar, select Configure > General > Credential Management.
2. Click New Credential to add a new user credential.
3. Type a Username of ubaesuser.
4. Type a Realm of uba.
5. Type the same Password for the credential that is used in UBA for this user, and type it again in Confirm password.
6. Select the App of SA-UEBA for the credential.
7. Click Save.
For the integration to work correctly, this user needs to exist in both UBA and Splunk ES. If the password for this user needs to be changed, it needs to be the same in both places.

**Edit an existing input credential**

You can edit passwords of existing input credentials.

1. On the Enterprise Security menu bar, select **Configure > General > Credential Management**.
2. In the **Action** column of a credential, click **Edit**.
3. Type a new **Password** for the credential, and type it again in **Confirm password**.
4. Click **Save**.

**Add a new certificate**

You cannot add a new certificate using Credential Management on a search head cluster (SHC). To add a new certificate to Splunk Enterprise Security on a SHC, add the certificate to `$SPLUNK_HOME/etc/shcluster/apps/<app_name>/auth` on the deployer and deploy the certificate to the SHC members.

1. On the Enterprise Security menu bar, select **Configure > General > Credential Management**.
2. Click **New Certificate** to add a new certificate.
3. Type a **File name** for the certificate. This is the file name that the certificate is saved as in the `$SPLUNK_HOME/etc/apps/<app_name>/auth` directory.
4. Add **Certificate text** for the certificate. Paste the contents of an existing certificate file here to add the certificate to Splunk Enterprise Security.
5. Select an **App** to save the certificate in.
6. Click **Save**.

**Edit an existing certificate**

You can edit the certificate text of existing certificates in Credential Management. You cannot edit certificates on a search head cluster.

1. On the Enterprise Security menu bar, select **Configure > General > Credential Management**.
2. In the **Action** column of a certificate, click **Edit**.
3. Type a new **Certificate text** for the certificate.
4. Click **Save**.

**Delete an existing input credential or certificate**

You cannot delete certificates on a search head cluster.

1. On the Enterprise Security menu bar, select **Configure > General > Credential Management**.
2. In the **Action** column of a credential or certificate, click **Delete**.
3. Click **OK** to confirm.

**Manage permissions in Splunk Enterprise Security**

Use the Permissions page to view and assign Enterprise Security capabilities to non-admin roles.

1. On the Enterprise Security menu bar, select **Configure > General > Permissions**.
2. Select the checkbox for the role and permissions for that role.
3. Click **Save**.

For more information about ES capabilities, see Configure users and roles in the *Installation and Upgrade Manual*.

**Customize the menu bar in Splunk Enterprise Security**

Customize the menu bar in Splunk Enterprise Security with the Edit Navigation view. Add new **dashboards**, reports, **views**, links to filtered dashboards, or links to the web to your menu bar. You must have Enterprise Security administrator privileges to make changes to the menu bar navigation.

You can add views to the menu bar as part of a collection that groups several views together or as an individual item on the menu bar. For example, Incident Review is an individual dashboard in the menu bar, and Audit is a collection of the audit dashboards.

Splunk Enterprise Security persists customizations you made to the navigation from previous versions.
Check for updated views

Views and collections that are new, updated, or deprecated in the version of the app that you have installed are highlighted with small icons that indicate the relevant changes.

After installing a new version of Splunk Enterprise Security or a new version of an app that provides views and collections for use in Enterprise Security, visit the Edit Navigation view to check for updates in those views and collections.

2. If any content has been updated, the message "Some content updates available" appears at the top of the navigation editor.
3. Look for icons on the views on the editor pane to find content that has been added, updated, or deprecated. These same icons also appear in the Add a New View and Add a New Collection menus.

Set a default view for Splunk Enterprise Security

To see a specific view when you or other users open Splunk Enterprise Security, set a default view.

2. Locate the view that you want to be the default view.
3. Click the checkmark icon that appears when you mouse over the view to Set this as the default view.
4. Click Save to save your changes
5. Click OK to refresh the page and view your changes.

Only views can be selected as default views.

Edit the existing menu bar navigation

2. Click and drag views or collections of views to change the location of the views or collections of views in the menu.
3. Click the X next to a view or collection to remove it from the menu.
4. Click the icon to edit the name of a collection.
5. Click the icon to add a divider and visually separate items in a collection.
6. Click Save to save your changes
7. Click OK to refresh the page and view your changes.

Add a single view to the menu bar

You can add a new view to the menu bar without adding it to a collection.

2. Click Add a New View.
3. Leave View Options set to the default of View.
4. Click Select a View from Unused Views.
5. Select a dashboard or view from the list.
6. Click Save. The dashboard appears on the navigation editor.
7. If you are finished adding items to the menu, click Save to save your changes
8. Click OK to refresh the page and view your changes.

Add a collection to the menu bar

Use a collection to organize several views or links together in the menu bar.

2. Click Add a New Collection.
3. Type a Name. For example, Audit.
4. Click Save. The collection appears on the navigation editor.

You must add a view or link to the collection before it appears in the menu navigation.

Add a view to an existing collection

Add views to an existing collection.

2. Locate the collection that you want to add views to.
3. Click the icon.
4. Leave **View Options** set to the default of **View**.
5. Click **Select a View** from **Unused Views**.
6. Select a view from the list.
7. Click **Save**. The view appears on the navigation editor.
8. If you are finished adding items to the menu, click **Save** to save your changes.
9. Click **OK** to refresh the page and view your changes.

**Add a link to the menu bar**

You can add a link to the menu bar of Splunk Enterprise Security. For example, add a link to a specifically-filtered view of Incident Review or to an external ticketing system.

*Create a link in the menu to an external system or webpage*

1. On the Enterprise Security menu bar, select **Configure > General > Navigation**.
2. Click **Add a New View** to add it to the menu, or locate an existing collection and click the △ icon to add the link to an existing collection of views.
3. Select **Link** from **View Options**.
4. Type a **Name** to appear on the Splunk Enterprise Security menu. For example, Splunk Answers.
5. Type a link. For example, https://answers.splunk.com/
6. Click **Save**.
7. If you are finished adding items to the menu, click **Save** to save your changes.
8. Click **OK** to refresh the page and view your changes.

*Add a link to a filtered view of Incident Review*

A common link to add to the menu bar is a filtered view of Incident Review.

1. Filter Incident Review with your desired filters. When you filter the dashboard, the URL updates with query string parameters matching your filters.
2. In the web browser address bar, copy the part of the URL that starts with /app/SplunkEnterpriseSecuritySuite/ and paste it in a plain text file for reference.
   For example, if you filtered the dashboard to show only critical notable events, the part of the URL that you copy looks like
   /app/SplunkEnterpriseSecuritySuite/incident_review?form.selected_urgency=critical
3. On the Enterprise Security menu bar, select **Configure > General > Navigation**.
4. Click **Add a New View** to add it to the menu, or locate an existing collection and click the **Add View** icon to add the link to an existing collection of views.
5. Select **Link** from **View Options**.
6. Type a **Name** to appear on the Splunk Enterprise Security menu. For example, **IR - Critical**.
7. In the **Link** field, paste the URL section. For example, `/app/SplunkEnterpriseSecuritySuite/incident_review?form.selected_urgency=critical`
8. Click **Save**.
9. If you are finished adding items to the menu, click **Save** to save your changes.
10. Click **OK** to refresh the page and view your changes.

If you add a link with multiple parameters you must modify the query string parameters by adding &. For example, type the link for a filtered view of Incident Review that shows new and unassigned notable events as

`/app/SplunkEnterpriseSecuritySuite/incident_review?form.status_form=0&form.owner_form=unassigned`

You can also construct a URL manually using the parameters in the following table. Use an asterisk to show all results for a specific parameter. Not all parameters are required.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Possible values</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>form.selected_urgency</code></td>
<td>Display notable events with the urgency specified by this parameter.</td>
<td>critical, high, medium, low, informational</td>
</tr>
<tr>
<td><code>form.status_form</code></td>
<td>Display notable events with the status specified by this parameter.</td>
<td>0 for unassigned, 1 for new, 2 for in progress, 3 for pending, 4 for resolved, 5 for closed</td>
</tr>
<tr>
<td><code>form.owner_form</code></td>
<td></td>
<td>usernames</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>Possible Value</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>form.source</td>
<td>Display notable events owned by the user specified by this parameter. HTML-encode spaces in the correlation search name and use the name that appears in the notable event rather than the name that appears on Content Management.</td>
<td>Endpoint - Host With Multiple Infections - Rule</td>
</tr>
<tr>
<td>form.rule_name</td>
<td>Display notable events created by the correlation search specified by this parameter. HTML-encode spaces in the correlation search name. Use the name that appears on Content Management.</td>
<td>Host With Multiple Infections</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>Possible Values</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>form.tag</strong></td>
<td>Displays notable events with the tag specified by this parameter.</td>
<td>malware, any custom tag value</td>
</tr>
<tr>
<td><strong>form.srch</strong></td>
<td>Displays notable events that match the SPL specified in this parameter. HTML-encode special characters such as = for key-value pairs.</td>
<td>dest=127.0.0.1</td>
</tr>
<tr>
<td><strong>form.security_domain_form</strong></td>
<td>Displays notable events in the security domain specified by this parameter.</td>
<td>access, endpoint, network, threat, identity, audit</td>
</tr>
<tr>
<td><strong>earliest</strong> and <strong>latest</strong></td>
<td>Displays notable events in the time range specified by these parameters. Specify a relative time range. HTML-encode special characters such as @.</td>
<td>-24h@h, now</td>
</tr>
<tr>
<td><strong>form.new_urgency_count_form</strong></td>
<td></td>
<td>critical, high, medium, low, informational</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>Possible Values</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>form.selected_urgency</td>
<td>Displays notable events that do not have the urgency specified by this parameter. Use multiple instances of this parameter to select multiple urgency settings.</td>
<td>critical, high, medium, low, informational</td>
</tr>
<tr>
<td>event_id</td>
<td>Displays the notable event that matches the specified event_id.</td>
<td>3C84A9D8-87F6-4066-8659-C7DD680F98E6@@notable@@80e0f89da83cad6665dd1de7447cedb4</td>
</tr>
<tr>
<td>form.association_type</td>
<td>Used together, displays the notable events associated with a short ID or an investigation.</td>
<td>short_id, investigation EYIYNW, 5a4be2b8cdc9736b2352c7c3</td>
</tr>
<tr>
<td>form.association_id</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Restore the default navigation**

To restore the default navigation of the Splunk Enterprise Security menu bar:

1. On the Enterprise Security menu bar, select **Configure > General > Navigation**.
2. In the upper right corner, click **Restore Default Configuration**.
3. Click **OK** to confirm.
4. Scroll to the bottom of page and click **Save**.

**Configure per-panel filtering in Splunk Enterprise Security**

Some dashboards in Splunk Enterprise Security include the per-panel filter option, which can filter items out of dashboard views, making it easier to find those events that require investigation.

- If you determine that an event is a threat, use the per-panel filter to add the item to your **blacklist** of known threats.
- If you determine that an event is not a threat, you can add it to your **whitelist** to remove it from the dashboard view.

The per-panel filter button appears only if the user has permission. To configure this permission, see Configure users and roles in the *Installation and Configuration* manual.

**Whitelist events**

After you determine that an event is not a threat, you can whitelist the event to hide it from the dashboard view. After you whitelist an event, the summary statistics continue to calculate whitelisted items, but the whitelisted items are not displayed in the dashboard.

**Whitelist an event**

Use the per-panel filter to whitelist, or filter, events on a dashboard.

For example, to whitelist traffic events on the **Traffic Size Analysis** dashboard:

1. Use the checkboxes to select the items to filter.
2. Click **Per-panel Filter** in the top right corner to display options for events that can be filtered in this dashboard.
3. Select the radio button to filter events on this dashboard.
   
   For example, on the **Traffic Size Analysis** dashboard, you can either filter events so that they no longer appear or highlight them so that they are flagged as important.
4. Click **Save** when you are done.
In this example, after an item is added to the whitelist, it is no longer considered a threat and no longer appears on the **Traffic Size Analysis** dashboard.

**Remove an item from the whitelist**

1. Click **Per-panel Filter**, then **View/edit lookup file** to see the list of entries currently being filtered.
2. Right-click a cell in the table to view the context menu.
3. Select **Remove row** to remove the row containing the whitelisted item.
4. Click **Save**.

**Blacklist events**

An event can also be blacklisted. Blacklisting an item means that you have identified an event that is known to be malicious, or thought to communicate with a command and control server that is known to be malicious. Anytime the event or string shows up in the data, you will want to investigate the system, the user associated with the system, and the web activity to understand the nature and possible proliferation of the threat.

Blacklisting an event or string is similar to whitelisting. Events can only be blacklisted after they have been filtered from the dashboard.

To blacklist a traffic event on, for example, the **Traffic Size Analysis** dashboard, do the following:

1. Click **Per-panel Filter**, then **View/edit lookup file** to see the list of entries currently being filtered.
2. Locate the entry you want to add to the blacklist. Under the **filter** column, double-click the word whitelist to edit the cell. Delete "whitelist" and type "blacklist".
3. Click **Save**.

**Edit the per-panel filter list**

To see a current list of per-panel filters by dashboard, select **Configure > Content > Content Management**. Lookups with a description indicating that they are a per-panel filter show the current per-panel filters for the dashboard in the lookup name. Events added to the whitelist for a dashboard are listed in that lookup.

For example, the **Threat Activity Filter** lookup displays the filters for the **Threat Activity** dashboard.
Edit the per-panel filter lookup.

1. Open the filter list for the relevant dashboard. The name of the filter, for example `ppf_threat_activity`, shows in the upper left-hand corner.
2. To edit a field, select a cell and begin typing.
3. To insert or remove a row or column in the filter, right-click the field for edit options. Removing a row adds that item back to the dashboard panel view and removes it from the whitelist.
4. To "blacklist" an item, use the editor to add a new row to the table and use "blacklist" in the "filter" column.
5. Click **Save** to save your changes.

**Audit per-panel filters**

Changes made to the per-panel filters are logged in the per-panel filtering audit logs. The lookup editor and the per-panel filter module modify per-panel filters. Use the Per-Panel Filter Audit dashboard to audit per-panel filters.

**Create a Splunk Web message in Splunk Enterprise Security**

Create a message in Splunk Web based on the results of a search using the **Create Splunk messages** alert action. Only administrators can create messages using this alert action.

The message that you create with this alert action must already exist in `messages.conf`. See Customize Splunk Web messages in the Splunk Enterprise Admin Manual for more about creating messages.

1. You can create Splunk Web messages from a search or from a correlation search:

<table>
<thead>
<tr>
<th>Option</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create a new alert</td>
<td>From the <strong>Search</strong> page in the <strong>Search and Reporting</strong> app, select <strong>Save As &gt; Alert</strong>. Type and select alert details and configure triggering and throttling as needed.</td>
</tr>
<tr>
<td>Create or edit a correlation search</td>
<td>From the ES menu bar, select <strong>Configure &gt; Content &gt; Content Management</strong>. Select <strong>Create New Content &gt; Correlation Search</strong>. Type and select correlation search configurations as needed.</td>
</tr>
<tr>
<td>Option</td>
<td>Steps</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Edit a correlation search</td>
<td>From the ES menu bar, select <strong>Configure &gt; Content &gt; Content Management</strong>. Select the correlation search.</td>
</tr>
</tbody>
</table>

2. Click **Add Actions** and select **Create Splunk messages**.

3. Select a **Name**. The name corresponds to a stanza in `messages.conf` of an existing message.
   For example, `DISK_MON:INSUFFICIENT_DISK_SPACE_ERROR`.

4. (Optional) Type a **Message ID** that identifies the message.
   For example, `insufficient_diskspace`.

5. (Optional) If a message uses field substitution, type the **Fields** to use. The fields used for argument substitution must be returned in the search results to be included in the message. Type the fields in the order that they must be substituted in the message.
   For example, for a message `Host %s has free disk space %d, below the minimum 5GB.`.
   type the fields `src,FreeMBytes`.

6. (Optional) Select **Yes** for **Keep Only Latest** and keep only the latest message produced by a search.
   For example, if the host has low disk space for three days, rather than get daily messages for three days, select **Yes** for this setting to only see one message.

7. Click **Save**.

**Troubleshoot script errors in Splunk Enterprise Security**

Troubleshoot script errors from modular inputs in Splunk Enterprise Security. If you see a message about a script exiting abnormally or a script that is in an unknown state, investigate the script and stanza that produced the error.

The **Audit - Script Errors** search replaces a configuration check script and creates Splunk messages to warn about non-zero exit codes that result from scripts in your Splunk deployment.

<table>
<thead>
<tr>
<th>Possible root cause</th>
<th>Verification</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The script did not run successfully.</td>
<td>Review the log files for the script. Run the script manually to see if it runs successfully, and review the</td>
<td>Address the reasons why the script exited with a non-zero exit code.</td>
</tr>
</tbody>
</table>
The script ran successfully with a non-zero exit code.

The script is in an unknown state. There is a stop time for the script, but no exit status or start time.

<table>
<thead>
<tr>
<th>Possible root cause</th>
<th>Verification</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>exit code that results.</td>
<td>Run the script manually to see if it runs successfully, and review the exit code that results.</td>
<td>Include the script in the suppression for the search so that it does not display messages for this script.</td>
</tr>
<tr>
<td>The script ran successfully with a non-zero exit code.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The script is in an unknown state. There is a stop time for the script, but no exit status or start time.</td>
<td>Check the modular input settings to confirm they are correct.</td>
<td>Correct the modular input settings.</td>
</tr>
</tbody>
</table>


Prevent messages about specific scripts

If needed, you can prevent messages about specific scripts by modifying the match syntax in the `script_error_msg_ignore` macro.

If you had locally-defined script suppression regex in the `[configuration_check://confcheck_script_errors]` stanza, you can replicate it in the macro. For example, the suppression stanza includes the following regular expression:

```
suppress =
((streamfwd|splunk-(wmi\.path|MonitorNoHandle\.exe|winevtlog\.exe|netmon\.exe|perfmon\.exe|regmon\.exe|wim32mon\.exe|powershell\.exe)).*exited with code 1)
```

The macro replicates this suppression with the following definition:

```
match(script,
"(streamfwd|splunk-(wmi\.path|MonitorNoHandle\.exe|winevtlog\.exe|netmon\.exe|perfmon\.exe|regmon\.exe|wim32mon\.exe|powershell\.exe))")
AND exit_status=1
```

To reduce the frequency of messages about specific scripts rather than prevent them from appearing, throttle the alerts. Set up alert throttling for the Audit - Script Errors search based on the necessary values, such as the script field.
• For Splunk Enterprise, see Throttle alerts in the Alerting Manual.
• For Splunk Cloud, see Throttle alerts in the Alerting Manual.

Disable the configuration checker

To stop the messages by disabling the configuration checks, such as confcheck_app_exports.py, do the following:

1. On the Enterprise Security menu bar, select Configure > General > Configuration Checker.
2. Find the name of the script and click Disable.

Though in the case of confcheck_app_exports.py specifically, see Export apps globally to verify if you want to export the apps or disable the configuration checker.

Export apps globally

Splunk Enterprise Security no longer selectively imports apps and add-ons based on the name of the app or add-on. Knowledge objects in apps and add-ons that are installed on the same search head as Splunk Enterprise Security and exported to other apps or globally are visible in Splunk Enterprise Security. Apps that are not exported globally are flagged by the confcheck_app_exports.py health check.

To verify a global export from the search head, check the local.meta file of the app or add-on for export = system. For further details, see the "Make Splunk knowledge objects globally available" section of App architecture and object ownership in the Splunk Enterprise Admin Manual.

Or when installing ES in a search head cluster environment, verify that your server.conf shclustering configuration is in $SPLUNK_HOME/etc/system/local/server.conf or is in an app that exports the server configuration globally via metadata:

[server]
export = system

See Prerequisites for installing Enterprise Security in a search head cluster environment in the Splunk Enterprise Installation and Upgrade Manual.
Troubleshoot messages about default indexes searched by the admin role

Troubleshoot Splunk messages about default indexes searched by the admin role in the Splunk platform.

Default admin searches include summary indexes

When the admin role searches summary indexes by default, you can see decreased performance. You can stop seeing messages about this setting by limiting the indexes searched by the admin role or by disabling the search.

Limit the indexes searched by the admin role

Prevent the admin role from searching summary indexes. You can identify summary index names because the index names end in _summary, such as endpoint_summary.

1. Select Settings > Access controls.
2. Click Roles.
3. Click admin.
4. From Indexes click any summary index to remove it from the selected indexes.
5. Click Save.

Disable the search to prevent messages

If you do not want to limit the indexes searched by the admin role, but you want to stop seeing messages, disable the search.

1. Select Settings > Searches, reports, and alerts.
2. Locate the Audit - Default Admin Search Indexes search.
3. Select Edit > Disable.
4. Click Disable.

Default admin searches include all non-internal indexes

When the admin role searches all non-internal indexes by default, you can see decreased performance. You can stop seeing messages about this setting by limiting the indexes searched by the admin role or disabling the search.
**Limit the indexes searched by the admin role**

Prevent the admin role from searching all non-internal indexes.

1. Select **Settings > Access controls**.
2. Click **Roles**.
3. Click **admin**.
4. From **Indexes** click **All non-internal indexes** to remove it from the selected indexes.
5. Click **Save**.

**Disable the search to prevent messages**

If you do not want to limit the indexes searched by the admin role, but you want to stop seeing messages, disable the search.

1. Select **Settings > Searches, reports, and alerts**.
2. Locate the **Audit - Default Admin Search All Non-Internal** search.
3. Select **Edit > Disable**.
4. Click **Disable**.

**Troubleshoot messages about unnecessary read or write access to investigation KV store collections**

Troubleshoot Splunk Web messages about roles that have unnecessary read or write access to the investigation KV store collections.

You might see the following error messages in Splunk Web:

Health Check: Review roles for unnecessary read or write access to the investigation_attachment collection and remove access if possible
Health Check: Review roles for unnecessary read or write access to the investigation_event collection and remove access if possible
Health Check: Review roles for unnecessary read or write access to the investigative_canvas_entries collection and remove access if possible
Health Check: Review roles for unnecessary read or write access to the files collection and remove access if possible
Health Check: Review roles for unnecessary read or write access to the investigation collection and remove access if possible
Health Check: Review roles for unnecessary read or write access to the investigative_canvas collection and remove access if possible
These messages are produced by the Audit - Investigation Collection ACLs saved search. The search looks for non-admin permissions to the investigation KV store collections.

**Remove the unnecessary read or write access from the collections**

If you see these messages, remove the corresponding `[collections/<stanza_name>]` collections from `$SPLUNK_HOME/etc/apps/SplunkEnterpriseSecuritySuite/metadata/local.meta`. Access to these collections by non-admin roles is not recommended. After making the changes, refresh the file cache from Splunk Web: http://<yoursplunkserver>:8000/en-us/debug/refresh?.

In a search head cluster environment, make these changes to the `local.meta` file on each member in the cluster, via the deployer if applicable. Then refresh the file cache from Splunk Web for each search head: http://<yoursplunkserver>:8000/en-us/debug/refresh?. Alternately, if there are more than a few members in the cluster, a rolling restart can be used instead of the debug/refresh command.

**Troubleshoot failed intelligence downloads in Splunk Enterprise Security**

If you receive the message that a threat list failed to download, there are several possible root causes.

<table>
<thead>
<tr>
<th>Possible root cause</th>
<th>Verification</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The threat or intelligence source is no longer available at the IP address or URL.</td>
<td>Attempt to visit the URL or curl the threat source manually.</td>
<td>Disable the intelligence source if it is no longer available to download.</td>
</tr>
<tr>
<td>Firewall or proxy settings are preventing the intelligence source from being accessed.</td>
<td>Test if you can visit the URL or curl the intelligence source manually on a different machine.</td>
<td>Modify the firewall or proxy settings to allow access to the intelligence source.</td>
</tr>
</tbody>
</table>
Troubleshoot dashboards in Splunk Enterprise Security

Each dashboard in Enterprise Security references data from various data models. Without the relevant data, the dashboards will remain empty. If you expect data to appear, or if the data appearing is older than you expect, follow these troubleshooting steps.

1. Perform a search against the data model. Click **Open in Search** in the lower left corner of a dashboard view to perform a direct search against the data model. The **New Search** dashboard also exposes the search commands and objects used to populate a particular view.

2. If the search yields no results, determine if any data required for a dashboard is available in the data model.
   1. See the **Dashboard requirements matrix** in this manual to determine the data model datasets used by a dashboard.
   2. Use the data model and data model dataset to search for events in the data model.

<table>
<thead>
<tr>
<th>Action</th>
<th>Search</th>
<th>Expected Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verify the data is normalized to the Common Information Model</td>
<td>`</td>
<td>datamodel data_model_name root_object_name search</td>
</tr>
<tr>
<td></td>
<td>`</td>
<td>datamodel Network_Traffic All_Traffic search</td>
</tr>
</tbody>
</table>

3. If no data is available, confirm the data model is being accelerated.
   1. In Enterprise Security, browse to **Audit > Data Model Audit**.
   2. Review the **Acceleration Details** panel for information about the data model acceleration status, such as when the latest data model acceleration occurred, or whether it is 100% complete. See Configure data models for Splunk Enterprise Security in the **Installation and Upgrade Manual**.

4. If the data model acceleration status is as expected, validate that additional required data sources are available. For example, the **User Activity** dashboard uses additional data sources.
<table>
<thead>
<tr>
<th>Dashboard Name</th>
<th>Data type</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User Activity</strong></td>
<td>Lookups</td>
<td>The Cloud Domains, Corporate Email Domains, and Corporate Web Domains lookup files.</td>
</tr>
<tr>
<td></td>
<td>Identities</td>
<td>The Identity fields: bunit, email, watchlist, work_city, work_country, work_lat, and work_long. For more details, see Identity lookup fields in this manual.</td>
</tr>
</tbody>
</table>
| | Correlation Searches | * High Volume Email Activity with Non-corporate Domains  
* Watchlisted Event Observed  
* Web Uploads to Non-corporate Sites by Users |
| **Access Anomalies** | Correlation Searches | * Impossible Travel Events Detected For Users |

**Troubleshoot lookups in Splunk Enterprise Security**

Troubleshoot Splunk issues regarding lookups and available memory.

**Lookups not respecting ASCII name order**

Splunk Enterprise does not honor lexicographical order of automatic search-time lookups when some of the lookups in a set are configured to execute in-memory versus when some of the lookups in the set are configured to be indexed.

For instance, if you have max_memtable_bytes set to 50MB, assets_by_cidr lookup set to 25MB, and assets_by_str lookup set to 75MB. This would cause assets_by_str to be indexed and assets_by_cidr to run in memory, resulting in assets_by_cidr inadvertently executing prior to assets_by_str.

Increase the max_memtable_bytes of the lookup stanza in the $SPLUNK_HOME/etc/system/default/limits.conf file. See limits.conf in the Splunk Enterprise Admin Manual.
Lookup tables exceeding the maximum length

Lookup table files that exceed the HTTP `httpServer:max_content_length` in `server.conf` will not be replicated across search head cluster members.

Increase the `max_content_length` of the `http_input` stanza in the `SPLUNK_HOME/etc/system/default/server.conf` file. See `server.conf` in the Splunk Enterprise Admin Manual.

Lookup files growing in excess of 1GB

Lookup table files involved in special search matches, such as CIDR or Wildcard, are required to run in memory. This can lead to running out of memory when using these features.

Increase the `max_memtable_bytes` of the lookup stanza in the `SPLUNK_HOME/etc/system/default/limits.conf` file. See `limits.conf` in the Splunk Enterprise Admin Manual.

Dashboard requirements matrix for Splunk Enterprise Security

The Enterprise Security dashboards rely on events that conform to the Common Information Model (CIM), and are populated from data model accelerations unless otherwise noted.

Dashboard panel to data model

**A - E**

<table>
<thead>
<tr>
<th>Dashboard Name</th>
<th>Panel Title</th>
<th>Data Model</th>
<th>Data Model Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Anomalies</td>
<td>Geographically Improbable Accesses</td>
<td>Relies on the <code>gia_summary</code> summary index, which is populated by the <code>Access - Geographically Improbable</code></td>
<td>Authentication.app, .src, .user</td>
</tr>
<tr>
<td>Dashboard Name</td>
<td>Panel Title</td>
<td>Data Model</td>
<td>Data Model Dataset</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>------------</td>
<td>--------------------</td>
</tr>
<tr>
<td></td>
<td><strong>Access - Summary Gen</strong> search. That search references the Authentication data model.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concurrent Application Accesses</td>
<td>Authentication</td>
<td>Authentication.app, .src, .user</td>
</tr>
<tr>
<td>Access Center</td>
<td>Access Over Time By Action</td>
<td>Authentication</td>
<td>Authentication.action</td>
</tr>
<tr>
<td></td>
<td>Access Over Time By App</td>
<td>Authentication</td>
<td>Authentication.app</td>
</tr>
<tr>
<td></td>
<td>Top Access By Source</td>
<td>Authentication</td>
<td>Authentication.src</td>
</tr>
<tr>
<td></td>
<td>Top Access By Unique User</td>
<td>Authentication</td>
<td>Authentication.user,.src</td>
</tr>
<tr>
<td></td>
<td>First Time Access - Last 7 days</td>
<td>None. Calls access_tracker lookup</td>
<td></td>
</tr>
<tr>
<td>Access Search</td>
<td>Inactive Account Usage - Last 90 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Completely Inactive Accounts - Last 90 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Account Usage For Expired Identities -</td>
<td>Authentication</td>
<td>Authentication.dest</td>
</tr>
<tr>
<td>Dashboard Name</td>
<td>Panel Title</td>
<td>Data Model</td>
<td>Data Model Dataset</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------------------------------</td>
<td>------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Account Management</td>
<td>Last 7 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Account Management Over Time</td>
<td>Change</td>
<td>All_Changes.Account_Management,.action</td>
</tr>
<tr>
<td></td>
<td>Account Lockouts</td>
<td></td>
<td>All_Changes.Account_Management,.result</td>
</tr>
<tr>
<td></td>
<td>Account Management By Source User</td>
<td></td>
<td>All_Changes.Account_Management,.src_user</td>
</tr>
<tr>
<td></td>
<td>Top Account Management Events</td>
<td></td>
<td>All_Changes.Account_Management,.action</td>
</tr>
<tr>
<td>Asset Center</td>
<td>Assets By Priority</td>
<td>Assets And Identities</td>
<td>All_Assets.priority,.bunit,.category,.owner</td>
</tr>
<tr>
<td></td>
<td>Assets By Business Unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assets By Category</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Asset Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asset Investigator</td>
<td>Asset Investigator</td>
<td>Based on swim lane selection</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dashboard Name</th>
<th>Panel Title</th>
<th>Data Model</th>
<th>Data Model Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Protection</td>
<td>Data Integrity Control By Index</td>
<td>Incident Management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sensitive Data</td>
<td>None. Calls a REST search on indexes checking for data integrity controls.</td>
<td></td>
</tr>
<tr>
<td>Default Account Activity</td>
<td>Default Account Usage Over Time</td>
<td>Authentication</td>
<td>Authentication.Default_Authentication,.action,.app</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Dashboard Name</th>
<th>Panel Title</th>
<th>Data Model</th>
<th>Data Model Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By App</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default Accounts In Use</td>
<td></td>
<td>Authentication.user_category, .dest, .user</td>
</tr>
<tr>
<td></td>
<td>Default Local Accounts</td>
<td></td>
<td>None. Calls useraccounts_tracker lookup</td>
</tr>
<tr>
<td>DNS Activity</td>
<td>Top Reply Codes By Unique Sources</td>
<td></td>
<td>DNS.message_type, DNS.reply_code</td>
</tr>
<tr>
<td></td>
<td>Top DNS Query Sources</td>
<td></td>
<td>DNS.message_type, DNS.src</td>
</tr>
<tr>
<td></td>
<td>Top DNS Queries</td>
<td></td>
<td>DNS.message_type, DNS.query</td>
</tr>
<tr>
<td></td>
<td>Queries Per Domain</td>
<td></td>
<td>DNS.message_type, DNS.query</td>
</tr>
<tr>
<td></td>
<td>Recent DNS Queries</td>
<td></td>
<td>DNS.message_type</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DNS.message_type, DNS.reply_code, DNS.dest, DNS.src, DNS.query_type, DNS.query, DNS.answer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dashboard Name</th>
<th>Panel Title</th>
<th>Data Model</th>
<th>Data Model Dataset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email Activity</td>
<td>Top Email Sources</td>
<td>Email</td>
<td>All_Email.src</td>
</tr>
<tr>
<td></td>
<td>Large Emails</td>
<td></td>
<td>All_Email.size, src, .src_user, .dest</td>
</tr>
<tr>
<td></td>
<td>Rarely Seen Senders</td>
<td></td>
<td>All_Email.protocol, .src, .src_user, .recipient</td>
</tr>
<tr>
<td></td>
<td>Rarely Seen Receivers</td>
<td></td>
<td>All_Email.protocol, .src, .recipient</td>
</tr>
<tr>
<td>Dashboard Name</td>
<td>Panel Title</td>
<td>Data Model</td>
<td>Data Model Dataset</td>
</tr>
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<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Email Search</td>
<td></td>
<td></td>
<td>All_Email.protocol, .recipient, .src, .src_user, .dest</td>
</tr>
<tr>
<td>Endpoint Changes</td>
<td>Endpoint Changes</td>
<td></td>
<td>All_Changes.Endpoint_Changes, .action</td>
</tr>
<tr>
<td></td>
<td>By Action</td>
<td>Change</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Endpoint Changes</td>
<td></td>
<td>All_Changes.Endpoint_Changes, .object_category</td>
</tr>
<tr>
<td></td>
<td>By Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Endpoint Changes</td>
<td></td>
<td>All_Changes.Endpoint_Changes, .object_category, .dest</td>
</tr>
<tr>
<td>Forwarder Audit</td>
<td>Event Count Over Time</td>
<td>None. Calls host_eventcount macro and search.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By Host</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hosts By Last Report</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Splunkd Process</td>
<td>Endpoint</td>
<td>Endpoint.Processes.cpu_load_percent, .mem_used, .process_exec, Endpoint_Ports_</td>
</tr>
<tr>
<td></td>
<td>Utilization</td>
<td></td>
<td>fillnull_dest.dest</td>
</tr>
<tr>
<td></td>
<td>Splunk Service Start</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mode</td>
<td></td>
<td>All_Application_State.Services.start_mode, .status, .service</td>
</tr>
<tr>
<td>HTTP Category</td>
<td>Category Distribution</td>
<td>Web</td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
<td></td>
<td>Web.src, .category</td>
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<td></td>
<td>Category Details</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Web.src, .dest, .category,</td>
</tr>
<tr>
<td>HTTP User</td>
<td>User Agent Distribution</td>
<td>Web</td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
<td></td>
<td>Web.http_user_agent_length, .http_user_agent</td>
</tr>
<tr>
<td></td>
<td>User Agent Details</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Web.http_user_agent_length, .src, .dest, .http_user_agent</td>
</tr>
<tr>
<td>Dashboard Name</td>
<td>Panel Title</td>
<td>Data Model</td>
<td>Data Model Dataset</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------------</td>
<td>---------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Identity Center</td>
<td>Identities By Priority</td>
<td>Assets and Identities</td>
<td>All_Identities.priority, .bunit, .category</td>
</tr>
<tr>
<td></td>
<td>Identities By Business Unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identities By Category</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identity Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identity Investigator</td>
<td>Identity Investigator</td>
<td>Based on swim lane selection</td>
<td></td>
</tr>
<tr>
<td>Incident Review Audit</td>
<td>Review Activity By Reviewer</td>
<td></td>
<td>None. Calls a search over the es_notable_events KV Store collection.</td>
</tr>
<tr>
<td>Incident Review Audit</td>
<td>Top Reviewers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident Review Audit</td>
<td>Notable Events By Status - Last 48 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident Review Audit</td>
<td>Notable Events By Owner - Last 24 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incident Review Audit</td>
<td>Recent Review Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indexing Audit</td>
<td>Events Per Day Over Time</td>
<td>None. Calls a search over the licensing_epd KV Store collection.</td>
<td></td>
</tr>
<tr>
<td>Indexing Audit</td>
<td>Events Per Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indexing Audit</td>
<td>Events Per Index (Last Day)</td>
<td></td>
<td>IDS_Attacks.severity</td>
</tr>
<tr>
<td>Dashboard Name</td>
<td>Panel Title</td>
<td>Data Model Dataset</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td>Intrusion Center</td>
<td>Attacks Over Time By Severity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Top Attacks</td>
<td>IDS_Attacks.dest, .src, .signature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scanning Activity (Many Attacks)</td>
<td>IDS_Attacks.signature</td>
<td></td>
</tr>
<tr>
<td></td>
<td>New Attacks</td>
<td>IDS_Attacks.ids_type</td>
<td></td>
</tr>
<tr>
<td>Intrusion Search</td>
<td>Investigations</td>
<td>None. Calls a search over the investigation KV Store collection.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investigation timelines</td>
<td>None. Calls a search over the investigation_event KV Store collection.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investigation note attachments</td>
<td>None. Calls a search over the investigation_attachment KV Store collection.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Action history</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investigation workbench artifacts</td>
<td>None. Calls one of five different searches. See Manage investigations in Splunk Enterprise Security.</td>
<td></td>
</tr>
<tr>
<td>Investigation workbench</td>
<td>Authentication Data</td>
<td>Authentication.app, .action, .src, .src_user, .dest, .user</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Certificate Activity</td>
<td>Certificates.SSL, .src, .src_port, .dest, .dest_port, .ssl_is_valid, .ssl_validity_window, .ssl_hash, .ssl_serial, .ssl_subject, .ssl_start_time, .ssl_end_time</td>
<td></td>
</tr>
<tr>
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<tr>
<td></td>
<td>Top Destinations</td>
<td></td>
<td>Web.dest, .src</td>
</tr>
<tr>
<td>Web Search</td>
<td></td>
<td></td>
<td>Web.http_method, .status, .src, .dest, .url</td>
</tr>
</tbody>
</table>

**Dashboards to Add-on**

Add-on dashboards are included in Splunk Enterprise Security. Use the navigation editor to add or rearrange dashboards on the menu bar. For more information about using the navigation editor, see Customize the menu bar in Splunk Enterprise Security.

To view the entire list of dashboards in Enterprise Security, select **Search > Dashboards**.

To review the list of dashboards in Enterprise Security by add-on, use Content Management and filter by app or data model. See Expand Content Management searches to view dependency and usage information in Splunk Enterprise Security.

**Enable Debug Logging in Splunk Enterprise Security**

You can enable debug logging for each component in Splunk Enterprise Security. See Enable debug logging in the Splunk Enterprise Troubleshooting Manual for general information about debug logging.
Enable Debug Logging for Adaptive Response Actions

Adaptive Response Actions have a global `param.verbose` setting that can be applied to the `alert_actions.conf` file to affect all invocations of the action. You can also use the `savedsearches.conf` file to place the action in "debug mode" for action invocations specific to that saved search.

To enable debug logging through the CLI, edit the `savedsearches.conf` file as follows:

```bash
## $SPLUNK_HOME/etc/apps/<app>/local/savedsearches.conf
[<search_name>]
...
action.<action_name>.param.verbose = true
...
```

After changing the parameter, reload savedsearches from the UI.

To enable debug logging through the GUI, set verbose to true in the following location:

1. From the Splunk platform menu bar, select Settings and click Searches, Reports, and Alerts.
2. Search for the name of saved search using the search filter.
3. Click Edit > Advanced Edit.
4. Scroll to `action.<action_name>.param.verbose`
5. Set it to true.
6. Click Save.


Enable Debug Logging for Custom Search Commands protocol, Version 2

See Version 2 protocol for information about version 2 of the Custom Search Command protocol.

You can use the "| noop log_DEBUG=*" command to set the Version 2 Custom Search Command protocol, or chunked, logging level to debug. This works due to a stream handler that sends the logging output to the sys.stderr stream, which
is used by searches and displayed in the search.log.

To set the noop command, append it to the end of your chunked custom search, for example:

| ... | <chunked_search_command> | noop log_DEBUG=* |

**Enable Debug Logging for Custom Search Command protocol, Version 1**

Version 1 of the Custom Search Command protocol, or Intersplunk search command, currently does not respect "| noop log_DEBUG=*". Log levels can only be modified by altering the command python script at your own risk. Intersplunk search commands currently log to their own explicit log files instead of search.log.

See Version 1 protocol for information about version 1 of the Custom Search Command protocol.

**Enable Debug Logging for Extensible Administration Interface Handlers**

Extensible Administration Interface (EAI) handlers log levels can be modified by altering the handler python script at your own risk.


**Enable Debug Logging for Modular Inputs**

Modular inputs use a globally defined "debug" setting that can be toggled in the inputs.conf file.

To enable debug logging through the CLI, edit the inputs.conf file as follows:

```
## $SPLUNK_HOME/etc/apps/<app>/local/inputs.conf
[<modular_input_name>://<module_input_instance>]
debug = true
```

To enable debug logging through the UI for most modular inputs, it is similar to the following:
1. From the Splunk platform menu bar, select **Settings** and click **Data inputs**.
2. Select a modular input such as **Threat Intelligence Manager**.
3. Click an input such as **da_ess_threat_local**.
4. Check the check box for **Debug**.
5. Click **Save**.

To enable debug logging through the UI for Asset and Identity Management:

1. From the Splunk Enterprise Security menu bar, select **Configure > Data Enrichment > Asset and Identity Management**.
2. Click the **Global Settings** tab.
3. Enable the toggle switch for **Debug Mode**.
4. Click **Save**.

See Modular inputs overview in the Splunk Enterprise *Developing Views and Apps for Splunk Web* manual for information about modular inputs.

### Enable Debug Logging for Script Handlers

Script handlers can use the `script.args.<N> = debug` setting in the `restmap.conf` file to enable debug mode (N here is an integer). Please note that the `scripttype` setting must be set to "persist" for this to work.

You cannot currently edit `script.args` in the `restmap.conf` file through the GUI.

To enable debug logging through the CLI, edit the `restmap.conf` file as follows:

```bash
## $SPLUNK_HOME/etc/apps/<app>/local/restmap.conf
[script:<script_handler_name>]
...script.arg.<N> = debug
...```

See `restmap.conf` in the Splunk Enterprise *Admin Manual* for general information about script handlers.

### Enable Debug Logging for Scripted Lookups

No UI or CLI methods are available for enabling debug logging of scripted lookups.
See Configure external lookups in the Splunk Enterprise Knowledge Manager Manual for general info about scripted lookups.

Log files in Splunk Enterprise Security

Splunk Enterprise Security uses many custom log files to log errors and activity specific to the application.

Use the log files to check for activity

You can check the log files for errors and activity. The path for all log files is $SPLUNK_HOME/var/log/splunk/.

**analyticstory_rest_handler.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>analyticstory_rest_handler</td>
<td>Analytic Stories: REST Handler</td>
<td>SA- ThreatIntelligence</td>
<td>Logs create, read, update, and delete (CRUD) operations for analytics stories.</td>
</tr>
</tbody>
</table>

**app_certs_rest_handler.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>app_certs_rest_handler</td>
<td>Application Certificates: REST Handler</td>
<td>SA-Utils</td>
<td>Logs CRUD options for certificates uploaded via the &quot;Credential Management&quot; page.</td>
</tr>
</tbody>
</table>

**app_imports_update.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>app_imports_update</td>
<td>App Imports Update: REST Handler</td>
<td>SA-Utils</td>
<td>Checks if apps, which had previously been imported, are not exporting their knowledge objects globally so that they are visible within ES. The output is complementary to</td>
</tr>
<tr>
<td>Sourcetype</td>
<td>Component</td>
<td>Eai:acl.app</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------------------</td>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the configuration_check.log file.</td>
<td></td>
</tr>
</tbody>
</table>

**app_permissions_manager.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>app_permissions_manager</td>
<td>App Permissions: Modular Input</td>
<td>SplunkEnterpriseSecuritySuite</td>
<td>Logs when permissions policies are changed or enforced.</td>
</tr>
</tbody>
</table>

**app_permissions_rest_handler.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>app_permissions_rest_handler</td>
<td>App Permissions: REST Handler</td>
<td>SplunkEnterpriseSecuritySuite</td>
<td>Persistent rest handler for returning a list of ES permissions related to the the ess_permissions page.</td>
</tr>
</tbody>
</table>

**appmaker_base_class.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>appmaker:base_class</td>
<td>App Maker: Base</td>
<td>SA-Utils</td>
<td>Super class for all the appmaker scripts. The make_on_prem.py script is used on Distributed Conf Management, which also has its own log file. The make_index_time_properties.py script is used by Distribute Conf Download.  Th make_content_pack.py script is used on Content Management when exporting knowledge objects.</td>
</tr>
</tbody>
</table>
### appmaker_make_content_pack.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>appmaker:make_content_pack</td>
<td>App Maker: Make Content Pack</td>
<td>SA-Utils</td>
<td>Logs when exporting from Content Management into an app.</td>
</tr>
</tbody>
</table>

### appmaker_make_on_prem.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>appmaker:make_on_prem</td>
<td>App Maker: Make On Prem</td>
<td>SA-Utils</td>
<td>Logs when downloading the distributed configuration management application &quot;Splunk_TA_AROnPrem&quot; in General Settings.</td>
</tr>
</tbody>
</table>

### appmaker_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>appmaker:rest_handler</td>
<td>App Maker: REST Handler</td>
<td>SA-Utils</td>
<td>Logs export requests from the Content Management page, including the export package name as well as the download requests for exported packages.</td>
</tr>
</tbody>
</table>

### apps_shc_es_deployer_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
</table>
### configuration_check.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>configuration_check</td>
<td>Configuration Check: Modular Input</td>
<td>SA-Utils</td>
<td>Logs output messages of the confcheck migration scripts, such as when migration from correlationsearches.conf to savedsearches.conf fails.</td>
</tr>
</tbody>
</table>

### contentinfo.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>contentinfo</td>
<td>ContentInfo: Search Command</td>
<td>SA-Utils</td>
<td>Logs the data sources referenced by contentinfo search-related objects.</td>
</tr>
</tbody>
</table>

### contentinfo_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>contentinfo_rest_handler</td>
<td>ContentInfo: REST Handler</td>
<td>SA-Utils</td>
<td>Logs errors and successful operations to the contentinfo REST handler and associated components, as used mostly by the Use Case Library and Analytic Story pages.</td>
</tr>
</tbody>
</table>

### correlationmigration_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>correlationsearches:migration_rest_handler</td>
<td>Correlation Migration: REST Handler</td>
<td>SA-ThreatIntelligence</td>
<td>Logs when migration from correlationsearches.conf to savedsearches.conf fails.</td>
</tr>
</tbody>
</table>

### customsearchbuilder_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>customsearchbuilder:rest_handler</td>
<td>Custom Search Builder:</td>
<td>SA-ThreatIntelligence</td>
<td>Logs when the search syntax of a</td>
</tr>
</tbody>
</table>
**REST Handler**

A correlation search, a lookup generating search, or an Assets and Identities LDAP search cannot be created or is incorrect.

---

**data_migrator.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>data_migrator</td>
<td>Data Migrator: Modular Input</td>
<td>SA-Utils</td>
<td>Logs migration operations during ES upgrades. For example, when searches are executed as first-time run tasks or when a CSV lookup table is migrated to a KV store collection during an app upgrade.</td>
</tr>
</tbody>
</table>

---

**datamodelsimple.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>datamodelsimple</td>
<td>Data Model Simple: Search Command</td>
<td>Splunk_SA_CIM</td>
<td>Logs when datamodelsimple starts and finishes processing in a search command.</td>
</tr>
</tbody>
</table>

---

**entity_merge.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
</table>

---

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### es_investigations_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>es_investigations_rest_handler</td>
<td>ES Investigations Conf: REST Handler</td>
<td>SplunkEnterpriseSecuritySuite</td>
<td>Returns knowledge objects and handles change request for them, also enforces schemas and other stanza-specific prefixes and so on.</td>
</tr>
</tbody>
</table>

### esconfighealth.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>esconfighealth</td>
<td>ES Configuration Health: Search Command</td>
<td>SplunkEnterpriseSecuritySuite</td>
<td>For installation and upgrade, logs the health of ES configurations against a manifest file that ships with each ES release. This typically logs as a result of running a config health check through the ES Configuration Health custom search command feature.</td>
</tr>
</tbody>
</table>
### ess_configured_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ess_configured_handler</td>
<td>ES Configured: REST Handler</td>
<td>SplunkEnterpriseSecuritySuite</td>
<td>Logs current configured version state of search head cluster captains and search head cluster members for ES during setup and reset.</td>
</tr>
</tbody>
</table>

### ess_content_importer.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ess_content_importer</td>
<td>ES Content Importer: Modular Input</td>
<td>SplunkEnterpriseSecuritySuite</td>
<td>Logs when importing content from installed apps.</td>
</tr>
</tbody>
</table>

### essinstaller2.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>essinstall2</td>
<td>ES Installer: Search Command</td>
<td>SplunkEnterpriseSecuritySuite</td>
<td>Logs installation status after setup completes.</td>
</tr>
</tbody>
</table>

### event_sequencing_engine.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>event_sequencing_engine_log</td>
<td>Event Sequencing Engine: Search Command</td>
<td>SplunkEnterpriseSecuritySuite</td>
<td>Logs event sequencing engine operations such as terminate for</td>
</tr>
<tr>
<td>Sourcetype</td>
<td>Component</td>
<td>Eai:acl.app</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------------------</td>
<td>-------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>expectedactivity.log</td>
<td></td>
<td></td>
<td>sequence templates.</td>
</tr>
<tr>
<td>expectedactivity</td>
<td>Expected Activity: Search Command</td>
<td>SA-Utils</td>
<td>Pertains to the Expected Activity custom search command. Logs when filling in gaps in results in preparation for use in statistical calculations. For example in stats, chart, or timechart.</td>
</tr>
<tr>
<td>governance_rest_handler.log</td>
<td>Governance: REST Handler</td>
<td>SA-ThreatIntelligence</td>
<td>Logs when handling governance configurations and collections.</td>
</tr>
<tr>
<td>identdelete.log</td>
<td>Identity Correlation Delete: Search Command</td>
<td>SA-IdentityManagement</td>
<td>Logs when pruning identities marked for deletion from the assets_by_str, assets_by_cidr, or identities_expanded collections.</td>
</tr>
<tr>
<td>identity_correlation_rest_handler.log</td>
<td>Identity Correlation: REST Handler</td>
<td>SA-IdentityManagement</td>
<td>Logs when creating, editing, validating, and deleting correlations.</td>
</tr>
<tr>
<td>Sourcetype</td>
<td>Component</td>
<td>Eai:acl.app</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>for automatic lookups.</td>
</tr>
</tbody>
</table>

**identity_manager.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Logs when asset and identity information is merged into Splunk asset and identity lookup tables.</td>
</tr>
</tbody>
</table>

**identitymapper.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Logs during reverse lookup searches for assets or identities.</td>
</tr>
</tbody>
</table>

**investigation_handler.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Logs errors and such related to investigations, such as investigation data, entries, attachments, and cross-references to investigations from the Incident Review.</td>
</tr>
</tbody>
</table>
### log_review_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>log_review_rest_handler</td>
<td>Log Review Conf: REST Handler</td>
<td>SA-ThreatIntelligence</td>
<td>Logs management information for REST changes made to log_review.conf, which is used by the Incident Review dashboard and Incident Review Settings page.</td>
</tr>
</tbody>
</table>

### lookup_table_custom_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>lookup_table_custom_rest_handler</td>
<td>Lookup Table Custom: REST Handler</td>
<td>SA-Utils</td>
<td>Logs interactions with ES-managed csv lookups, including uploading new lookups through content management, as well as editing lookups in the lookup editor.</td>
</tr>
</tbody>
</table>

### managed_lookups_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>managed_lookups_rest_handler</td>
<td>Managed Lookups: REST Handler</td>
<td>SA-Utils</td>
<td>Logs internal operations such as settings checks for</td>
</tr>
</tbody>
</table>
### managed_nav_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>managed_nav_rest_handler</td>
<td>Managed Navigation: REST Handler</td>
<td>SA-Utils</td>
<td>Logs CRUD operations for the ES navigation menu, typically through the Navigation editor page.</td>
</tr>
</tbody>
</table>

### modaction_adhoc_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
</table>

### modaction_invocations_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>modaction:invocations_rest_handler</td>
<td>Modular Action Invocations: REST Handler</td>
<td>Splunk_SA_CIM</td>
<td>CIM: Adaptive Response actions execution</td>
</tr>
</tbody>
</table>

### modaction_queue_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>modaction:queue_handler</td>
<td>Modular Action Queue: RESTHandler</td>
<td>Splunk_SA_CIM</td>
<td>Logs when handling the queue for</td>
</tr>
</tbody>
</table>
### notable_event_suppression.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>notable_event_suppression</td>
<td>Notable Event Suppression: Base</td>
<td>SA-ThreatIntelligence</td>
<td>Logs when managing notable event suppressions.</td>
</tr>
</tbody>
</table>

### notable_event_suppression_autoDisable.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>notable_event_suppression:autoDisable</td>
<td>Notable Event Suppression: Auto Disable</td>
<td>SA-ThreatIntelligence</td>
<td>Logs on auto-disable for notable event suppressions of Adhoc Risk Events.</td>
</tr>
</tbody>
</table>

### notable_update_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>notable_update_rest_handler</td>
<td>Notable Event Update: REST Handler</td>
<td>SA-ThreatIntelligence</td>
<td>Logs when changing notable events in Incident Review.</td>
</tr>
</tbody>
</table>

### outputcheckpoint.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>outputcheckpoint</td>
<td>Output Checkpoint: Search Command</td>
<td>SA-Utils</td>
<td>Logs when outputting the results of the previous search pipeline to a modular input checkpoint directory.</td>
</tr>
</tbody>
</table>
### per_panel_filtering.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>per_panel_filtering</td>
<td>Per Panel Filtering</td>
<td>SA-Utils</td>
<td>Logs per panel filtering changes.</td>
</tr>
</tbody>
</table>

### relaymodaction.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>relaymodaction</td>
<td>Modular Action</td>
<td>Splunk_SA_CIM</td>
<td>Logs when managing remote Splunk instance modular actions.</td>
</tr>
<tr>
<td></td>
<td>Relay: Modular</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### reviewstatuses_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>reviewstatuses:rest_handler</td>
<td>Reviewstatuses:</td>
<td>SA-ThreatIntelligence</td>
<td>Logs when handling knowledge objects for configuring notable statuses and investigation statuses.</td>
</tr>
<tr>
<td></td>
<td>REST Handler</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### sequence_instance_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sequence_instance_rest_handler</td>
<td>Sequence Instance:</td>
<td>SplunkEnterpriseSecuritySuite</td>
<td>Logs when handling an instance of a running sequenced event.</td>
</tr>
<tr>
<td></td>
<td>REST Handler</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### sequence_templates_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sequence_templates_rest_handler</td>
<td>Sequence Templates:</td>
<td>SplunkEnterpriseSecuritySuite</td>
<td>Logs when making CRUD operations to</td>
</tr>
<tr>
<td></td>
<td>REST Handler</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### sorttimecols.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sorttimecols</td>
<td>Sort Time Columns: Search Command</td>
<td>SA-Utils</td>
<td>Pertains to the sorttimecols custom search command. Logs when using the sorttimecols commands to sort columns in a result set by time.</td>
</tr>
</tbody>
</table>

### suppressions_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>notable_event_suppression:rest_handler</td>
<td>Notable Event Suppression: REST Handler</td>
<td>SA-ThreatIntelligence</td>
<td>REST handler for notable event suppression create and edit. For use in conjunction with the notable_event_suppression.log file.</td>
</tr>
</tbody>
</table>

### threat_intel_file_upload_rest_handler.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>threatintel:file_upload_rest_handler</td>
<td>Threat Intel Upload: REST Handler</td>
<td>DA-ESS-ThreatIntelligence</td>
<td>rest handler for uploading threat intelligence files</td>
</tr>
</tbody>
</table>

### threat_intelligence_manager.log

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>threatintel:manager</td>
<td>Threat Intel Manager: Modular Input</td>
<td>DA-ESS-ThreatIntelligence</td>
<td>Logs when the modular input parses the threat sources and updates the KV Store threat</td>
</tr>
</tbody>
</table>
collections with any new intelligence.

**threat_intelligence_rest_handler.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
</table>

**threatlist.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>threatintel:download</td>
<td>Intelligence Download: Modular Input</td>
<td>SA-ThreatIntelligence</td>
<td>Logs the status of threat intel downloads, including success and failure.</td>
</tr>
</tbody>
</table>

**transitioners_rest_handler.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>transitioners_rest_handler</td>
<td>Transitioners: REST Handler</td>
<td>SA-ThreatIntelligence</td>
<td>notable status handler, checking permission who can change status, also migrates from authorize.conf to reviewstatuses.conf.</td>
</tr>
</tbody>
</table>

**uba_rest.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>uba:rest_handler</td>
<td>UBA: REST Handler</td>
<td>SA-UEBA</td>
<td>Pertains to the UBA Integration rest handler.</td>
</tr>
</tbody>
</table>

**whois_manager.log**

<table>
<thead>
<tr>
<th>Sourcetype</th>
<th>Component</th>
<th>Eai:acl.app</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>whois_manager</td>
<td>Whois Manager: Modular Input</td>
<td>SA-NetworkProtection</td>
<td>Logs when executing the whois modular.</td>
</tr>
</tbody>
</table>
Use search to check for activity

You can use search to check for errors and activity. The majority of sourcetypes can be searched in the _internal index. The notable_update_rest_handler can also be searched for as a source in the _audit index.

Searching the _internal index for notable_update_rest_handler will show you, for example, what happens during the handler review process. **Example search:**

```
index=_internal sourcetype="notable_update_rest_handler"
```

**Example response:**

<table>
<thead>
<tr>
<th>i</th>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12/2/19</td>
<td>2019-12-02 20:07:16,524+0000 INFO pid=8649 tid=MainThread file=notable_update_rest_handler.py:setStatuses:957 Done editing events matching search admin__admin__SplunkEnterpriseSecuritySuite__RMD57f02abc0263583b0_1575317218.11939 host = hostname = /usr/local/bamboo/splunk-install/current/var/log/splunk/notable_update_rest_handler.log sourcetype = notable_update_rest_handler</td>
</tr>
<tr>
<td></td>
<td>12/2/19</td>
<td>2019-12-02 20:07:16,524+0000 INFO pid=8649 tid=MainThread file=cim_actions.py:message:425 I sendmodaction - worker=&quot;soln-esnightly1&quot; signature=&quot;Successfully created splunk events&quot; action_name=&quot;notable_event_edit&quot; digest_mode=&quot;1&quot; action_mode=&quot;adhoc&quot; event_count=&quot;1&quot; host = hostname source = /usr/local/bamboo/splunk-install/current/var/log/splunk/notable_update_rest_handler.log sourcetype = notable_update_rest_handler</td>
</tr>
</tbody>
</table>
Searching the _audit index for the source of notable_update_rest_handler will show you, for example, what was saved to the KV Store during the handler processing. This is not necessarily for troubleshooting, but more specific to incident review activity.

Example search:

```
index=_audit sourcetype="incident_review"
```

Example response:

<table>
<thead>
<tr>
<th>i</th>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/2/19 3:07:13.090 PM</td>
<td>1575317233.09,19E67472-762C-4636-9A91-E4CF6B4BD885@@notable@@15c339addb8d09e6d8a24176beafd9792bd84f45,Host With Multiple Infections,4,esadmin,high,comment,admin,True</td>
<td></td>
</tr>
</tbody>
</table>

host = hostname source = notable_update_rest_handler sourcetype = incident_review
Machine Learning Toolkit

Machine Learning Toolkit Overview in Splunk Enterprise Security

The Splunk Machine Learning Toolkit (MLTK) is replacing Extreme Search (XS) as a model generation package in Enterprise Security (ES). MLTK can scale at larger volume and also can identify more abnormal events through its models. See Welcome to the Machine Learning Toolkit in the Splunk Machine Learning Toolkit User Guide.

In an effort to improve performance and save space as compared to XS, MLTK behaves differently. As an example, XS runs on a schedule, such as daily, over a short time window. Then XS stores its models, and many of the searches merge daily data into those models, so that the historical data grows bigger over the course of a year. MLTK also runs on a schedule, such as daily, but over a bigger time window. MLTK does not merge the daily data, but replaces it with every run. The MLTK data does not grow as large, and remains more relevant to the current timeframe.

Fit and apply commands

The main commands that are replacing the XS commands are fit and apply. The default correlation searches that use XS in ES are updated for you. If you have any custom correlation searches that are using XS commands, you need to revise them accordingly. See Convert Extreme Searches to Machine Learning Toolkit.

Creating models and finding anomalies

XS and MLTK are similar in many ways:

- Both XS and MLTK create models.
- Both XS and MLTK represent distributions in their models.
- Both XS and MLTK in ES use "low", "medium", "high" and "extreme" to represent threshold values. For details about threshold values, see Machine Learning Toolkit Macros in Splunk Enterprise Security.
- XS and MLTK both use their models to find outliers.
- Both use thresholds like "above high" to define what values to consider as outliers.
Creating models with `xscreateddcontext` versus with `fit`

XS uses both `xscreateddcontext` and `xsupdateddcontext` to build models. MLTK uses `fit` to build models.

The `xscreateddcontext` command creates a new model each time the context gen search is run. The following example shows a context gen search that uses `xscreateddcontext`:

```bash
|tstats summariesonly=true allow_old_summaries=true count as web_event_count from datamodel=Web.Web by Web.src, Web.http_method, _time span=24h | rename "Web:*" as * | where match(http_method, "^[A-Za-z]+$") | stats count(web_event_count) as count min(web_event_count) as min max(web_event_count) as max avg(web_event_count) as avg median(web_event_count) as median stdev(web_event_count) as size by http_method | eval min=0 | eval max=median*2 | xscreateddcontext name=count_by_http_method_by_src_1d container=web class="http_method" app="SA-NetworkProtection" scope=app type=domain terms="minimal,low,medium,high,extreme" | stats count
```

The `xsupdateddcontext` command merges the new results into the existing model each time the context gen search is run. The following example shows a context gen search that uses `xsupdateddcontext`:

```bash
|tstats `summariesonly` count as failures from datamodel=Authentication.Authentication by authentication.src, _time span=1h | stats median(failures) as median, min(failures) as min, count as count | eval max = median*2 | xsupdateddcontext app="sa-accessprotection" name=failures_by_src_count_1h container=authentication scope=app | stats count
```

The `fit` command builds a model, replacing the data each time the model gen search is run, and the `apply` command lets you use that model later. The following example shows a model gen search that uses `fit`:

```bash
```
**Finding anomalies with `xswhere` versus `apply`**

XS and MLTK both use their models to find outliers. Both use thresholds like "above high" to define what values to consider as outliers. For example, if you use "above high", then `xswhere` or `apply` functions show all values that are above the highest 5% (0.05). If you change this to "above extreme", then the values are above the highest 1% (0.01).

The following example shows a search that uses `xswhere`:

```sh
tstats `summariesonly` count as web_event_count from datamodel=web.web by web.src, web.http_method | `drop_dm_object_name("web")` | `xswhere web_event_count from count_by_http_method_by_src_1d in web by http_method is above high`
```

The following example shows a search that uses `apply`:

```sh
```

To verify the qualitative IDs and thresholds, use the following search:

```sh
| inputlookup qualitative_thresholds_lookup
```

<table>
<thead>
<tr>
<th>qualitative_id</th>
<th>qualitative_label</th>
<th>threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>extreme</td>
<td>extreme</td>
<td>0.01</td>
</tr>
<tr>
<td>high</td>
<td>high</td>
<td>0.05</td>
</tr>
<tr>
<td>medium</td>
<td>medium</td>
<td>0.1</td>
</tr>
<tr>
<td>low</td>
<td>low</td>
<td>0.25</td>
</tr>
<tr>
<td>minimal</td>
<td>minimal</td>
<td>0.5</td>
</tr>
</tbody>
</table>

**Finding outliers with DensityFunction**

Anomalies and outliers are not necessarily bad, they're just different. As you gather data over time, you'll start to recognize what's standard. You might notice deviation from past behavior or you might notice deviation from peers. As you think about the deviation, then you'll start to consider upper and lower bounds from the standard. Outside of the bounds is where you'll find your anomalies and outliers.

The DensityFunction's distribution is normal, exponential, or gaussian. ES searches are explicitly configured with the normal DensityFunction setting of
**dist=norm** for those that use `fit`. You can modify the type of distribution for each MTLK model when using the `fit` command. Valid values for the dist parameter include: norm (normal distribution), expon (exponential distribution), gaussian_kde (Gaussian Kernel Density Estimation distribution), and auto (automatic selection). See Anomaly Detection in the Splunk Machine Learning Toolkit *User Guide*.

The threshold parameter is the center of the outlier detection process. It represents the percentage of the area under the density function and has a value between \(0.000000001\) (refers to \(\sim 0\%\)) and 1 (refers to 100\%). The threshold parameter guides the DensityFunction algorithm to mark outlier areas on the fitted distribution. For example, if threshold=0.01, then 1\% of the fitted density function will be set as the outlier area.

The shape of a normal distribution is that of a bell curve. Consider the scenario of network traffic volume over time. Maybe most of the traffic occurs during certain cycles. The data is naturally in a normal bell curve.

![Bell Curve](image)

The x-axis is values. The y-axis is the number of times you see that particular value. If you see a slight increase compared to the number of times you usually see a value, it's not necessarily an outlier that you need to investigate. But if you see a large spike compared to the number of times you usually see a value, then it's probably important to investigate because it's outside the normal bounds of your upper or lower threshold.

![Thresholds](image)

Not all data is naturally in the shape of a bell curve, so you might need to use the "auto" dist parameter to help you find the accurate shape of your data. For example, your data might be in a Gaussian Kernel Density Estimation shape. In this case, your outliers might not be outside of upper and lower thresholds, but beyond a percentage of standard deviation.
When you're exploring your data, sometimes you already have known outliers. In some cases, you want to clean up those outliers before you train your model. For example, if you have a device on your network that is doing active or passive vulnerability scans, then you want to remove that from the results. You don't need to limit this to only known outliers. For example, if you have test servers generating data that fits in the middle of the distribution curve, this will change your curve to put more weight in the middle of the curve. This is also undesirable.

**Regular search:**

```
| tstats `summariesonly` count as total_count from datamodel=Network_Traffic.All_Traffic by _time span=30m | fit DensityFunction total_count dist=norm into app:network_traffic_count_30m
```

**Search with outliers removed from the source:**

Notice filtering out the CIDR range of the test servers by using .src!=10.11.36.0/24.

```
| tstats `summariesonly` count as total_count from datamodel=Network_Traffic.All_Traffic where All_Traffic.src !=10.11.36.0/24 by _time span=30m | fit DensityFunction total_count dist=norm into app:network_traffic_count_30m
```

You can also filter out those results when you apply the data to your model.

Most people are used to analyzing with eventstats or streamstats, gathering data just in time for analysis. The difference with MLTK is that the probability density function uses averages and standard deviations for building a model. Then you can send your data as input into the model, and then output the outliers.

**Machine Learning Toolkit Searches in Splunk Enterprise Security**

Extreme Search (XS) context generating searches with names ending in "Context Gen" are revised to use Machine Learning Toolkit (MLTK) and are renamed to end with "Model Gen" instead. Other saved searches, correlation searches, key indicator searches, and rules that used XS keep their names but are also revised to use MLTK. If you have any locally modified XS searches, you
need to port them over to use MLTK.

Since XS correlation searches no longer use XS, the corresponding Model Gen searches must first be run to generate a model. As mentioned in the overview, MLTK does not merge daily data into the model, but replaces it with every run. If you want to experiment with running and tuning a model without overwriting it, see Machine Learning Toolkit Troubleshooting in Splunk Enterprise Security.

**Searches migrating from XS to MLTK**

The list of default searches, correlation searches, key indicators, and rules that are revised from XS to MLTK follows.

**DA-ESS-AccessProtection**

### XS: Access - Total Access Attempts

```
| tstats `summariesonly` count as current_count from datamodel=authentication.authentication where earliest=-24h@h latest=+0s | appendcols [ | tstats `summariesonly` count as historical_count from datamodel=authentication.authentication where earliest=-48h@h latest=-24h@h ] | `get_ksi_fields(current_count,historical_count)` | xsfindbestconcept current_count from count_1d in authentication as current_count_qual | xsfindbestconcept delta from percentile in default as delta_qual
```

### MLTK: Access - Total Access Attempts

```
| tstats `summariesonly` count as current_count from datamodel=Authentication.Authentication where earliest=-24h@h latest=+0s | appendcols [ | tstats `summariesonly` count as historical_count from datamodel=Authentication.Authentication where earliest=-48h@h latest=-24h@h ] | `get_ksi_fields(current_count,historical_count)` | `mltk_findbest("app:authentication_count_1d")` | `get_percentage_qualitative(delta, delta_qual)```

**DA-ESS-EndpointProtection**

### XS: Change - Abnormally High Number of Endpoint Changes By User - Rule

```
| `tstats` count from datamodel=endpoint.filesystem where filesystem.tag="change" by filesystem | eval change_type="filesystem",user='filesystem.user' | `tstats` append=t count from datamodel=endpoint.registry where registry.tag="change" by registry.user | eval change_type=if(isnull(change_type),"registry",change_type),user=if(isnull(user),'registry.user',user) | `tstats` append=t count from datamodel=change.all_changes where nodename="all_changes.endpoint_changes" by all_changes.change_type,all_changes.user | `get_ksi_fields(change_type)` | xsfindbestconcept change_type from count_1d in change.all_changes as change_type_qual | xsfindbestconcept delta from percentile in default as delta_qual
```

### MLTK: Change - Abnormally High Number of Endpoint Changes By User - Rule

```
| `tstats` count from datamodel=Endpoint.Filesystem where filesystem.tag="change" by filesystem | eval change_type="filesystem",user='filesystem.user' | `tstats` append=t count from datamodel=Endpoint.Registry where registry.tag="change" by registry.user | eval change_type=if(isnull(change_type),"registry",change_type),user=if(isnull(user),'registry.user',user) | `tstats` append=t count from datamodel=change.all_changes where nodename="all_changes.endpoint_changes" by all_changes.change_type,all_changes.user | `mltk_findbest("app:change_type")` | `get_percentage_qualitative(delta, delta_qual)```

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MLTK: Change - Abnormally High Number of Endpoint Changes By User - Rule

| `tstats` count from datamodel=Endpoint.Filesystem where Filesystem.tag="change" by Filesystem.user | eval change_type="filesystem",user='Filesystem.user' | `tstats` append=T count from datamodel=Endpoint.Registry where Registry.tag="change" by Registry.user | eval change_type="registry",user='Registry.user' | `tstats` append=T count from datamodel=Change.All_Changes where change_type='All_Changes.change_type',user='All_Changes.user' | stats count as change_count by change_type,user |

XS: Endpoint - Host Sending Excessive Email - Rule

| tstats `summariesonly` sum(all_email.recipient_count) as count,dc(all_email.dest) as dest_count from datamodel=email.all_email where NOT all_email.src_category="email_servers" by "all_email.src",_time span=1h | `drop_dm_object_name("all_email")` | xswhere count from recipients_by_src_1h in email is above medium or dest_count from destinations_by_src_1h in email is above medium

MLTK: Endpoint - Host Sending Excessive Email - Rule

| tstats `summariesonly` sum(All_Email.recipient_count) as recipient_count,dc(All_Email.dest) as dest_count from datamodel=Email.All_Email where NOT All_Email.src_category="email_servers" by "All_Email.src",_time span=1h | `drop_dm_object_name("All_Email")` | apply app:recipients_by_src_1h [\`get_qualitative_upper_threshold(high)`] | apply app:destinations_by_src_1h [\`get_qualitative_upper_threshold(high)`] | search "IsOutlier(recipient_count)"=1 OR "IsOutlier(dest_count)"=1

XS: Malware - Total Infection Count

| tstats `summariesonly` dc(malware_attacks.signature) as infection_count from datamodel=malware.malware_attacks where earliest=-24h@h latest=+0s malware_attacks.action=allowed by malware_attacks.dest | stats sum(infection_count) as current_count | appendcols [\| tstats `summariesonly` dc(malware_attacks.signature) as infection_count from datamodel=malware.malware_attacks where earliest=-48h@h latest=-24h@h malware_attacks.action=allowed by malware_attacks.dest | stats sum(infection_count) as historical_count] | `get_ksi_fields(current_count,historical_count)` | xsfindbestconcept current_count from malware as current_count_qual | xsfindbestconcept delta from percentile in default as delta_qual

MLTK: Malware - Total Infection Count

| tstats `summariesonly` dc(Malware_Attacks.signature) as infection_count from datamodel=Malware.Malware_Attacks where earliest=-24h@h latest=+0s Malware_Attacks.action=allowed Malware_Attacks.dest | stats sum(infection_count) as current_count | appendcols [\| tstats `summariesonly` dc(Malware_Attacks.signature) as infection_count from datamodel=Malware.Malware_Attacks where earliest=-48h@h latest=-24h@h Malware_Attacks.action=allowed by Malware_Attacks.dest | stats sum(infection_count) as historical_count] | `get_ksi_fields(current_count,historical_count)` |
MLTK: Identity - High Volume Email Activity with Non-corporate Domains - Rule

| tstats `summariesonly` sum(all_email.size) as bytes, values(all_email.recipient) as recipient from datamodel=email.all_email where not `cim_corporate_email_domain_search("all_email.recipient")` by all_email.src_user | `drop_dm_object_name("all_email")` | xsfindbestconcept bytes from email_volume_1h_noncorp | eval risk_score=case(bestconcept="extreme",80,bestconcept="high",50,bestconcept="medium",20,1==1, 0) | search risk_score>0

MLTK: Identity - Web Uploads to Non-corporate Domains - Rule

| tstats `summariesonly` sum(Web.bytes) as bytes from datamodel=Web.Web where (Web.http_method="POST" OR Web.http_method="PUT") not (`cim_corporate_web_domain_search("Web.url")`) by Web.user | `drop_dm_object_name("Web")` | xsfindbestconcept bytes from web_volume_1h_noncorp | eval risk_score=case(bestconcept="extreme",80,bestconcept="high",50,bestconcept="medium",20,1==1, 0) | search risk_score>0

DA-ESS-NetworkProtection

XS: Network - Unusual Volume of Network Activity - Rule

| tstats `summariesonly` dc(all_traffic.src) as src_count,count from datamodel=network_traffic.all_traffic | localop | xswhere count from count_30m in network_traffic is extreme or src_count from src_count_30m in network_traffic is extreme | eval const_dedup_id="network - unusual volume of network activity - rule"
| tstats `summariesonly` dc(All_Traffic.src) as src_count,count as total_count from datamodel=Network_Traffic.All_Traffic | localop | apply network_traffic_src_count_30m
[|`get_qualitative_upper_threshold(extreme)`] | apply network_traffic_count_30m [|`get_qualitative_upper_threshold(extreme)`] | search "IsOutlier(src_count)"=1 OR "IsOutlier(total_count)"=1

**XS: Web - Abnormally High Number of HTTP Method Events By Src - Rule**

| tstats `summariesonly` count as web_event_count from datamodel=web.web by web.src, web.http_method | `drop_dm_object_name("web")` | xswhere web_event_count from count_by_http_method_by_src_1d in web by http_method is above high

**MLTK: Web - Abnormally High Number of HTTP Method Events By Src - Rule**


**SA-AccessProtection**

**XS: Access - Authentication Failures By Source - Context Gen**

| tstats `summariesonly` count as failures from datamodel=authentication.authentication where authentication.action="failure" by authentication.src,_time span=1h | stats median(failures) as median, min(failures) as min, count as count | eval max = median*2 | xsupdateddcontext app="sa-accessprotection" name=failures_by_src_count_1h container=authentication scope=app | stats count

**MLTK: Access - Authentication Failures By Source - Model Gen**

| tstats `summariesonly` count as failure from datamodel=Authentication.Authentication where Authentication.action="failure" by Authentication.src,_time span=1h | fit DensityFunction failure dist=norm into app:failures_by_src_count_1h

**XS: Access - Authentication Failures By Source Per Day - Context Gen**

| tstats `summariesonly` count as failures from datamodel=authentication.authentication where authentication.action="failure" by authentication.src,_time span=1d | stats median(failures) as median, min(failures) as min, count as count | eval max = median*2 | xscreateddcontext app="sa-accessprotection" name=failures_by_src_count_1d container=authentication scope=app type=domain terms=`xs_default_magnitude_concepts` | stats count

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MLTK: Access - Authentication Failures By Source Per Day - Model Gen

| tstats `summariesonly` count as failure from datamodel=Authentication.Authentication where Authentication.action="failure" by Authentication.src,_time span=1d | fit DensityFunction failure dist=norm into app:failures_by_src_count_1d

XS: Access - Authentication Volume Per Day - Context Gen

| tstats `summariesonly` count as count_1d from datamodel=authentication.authentication by _time span=1d | stats count, median(count_1d) as median, stdev(count_1d) as size | search size>0 | xscreateddcontext name=count_1d container=authentication type=median_centered scope=app app=sa-accessprotection terms=`xs_default_magnitude_concepts` | stats count

MLTK: Access - Authentication Volume Per Day - Model Gen

| tstats `summariesonly` count as current_count from datamodel=Authentication.Authentication by _time span=1d | fit DensityFunction current_count dist=norm into app:authentication_count_1d

XS: Access - Brute Force Access Behavior Detected - Rule

| from datamodel:"authentication"."authentication" | stats values(tag) as tag,values(app) as app,count(eval('action'="failure")) as failure,count(eval('action'="success")) as success by src | search success>0 | xswhere failure from failures_by_src_count_1h in authentication is above medium

MLTK: Access - Brute Force Access Behavior Detected - Rule

| from datamodel:"Authentication"."Authentication" | stats values(tag) as tag,values(app) as app,count(eval('action'="failure")) as failure,count(eval('action'="success")) as success by src | search success>0 | `mltk_apply_upper("app:failures_by_src_count_1h", "high", "failure")`

XS: Access - Brute Force Access Behavior Detected Over 1d - Rule

| tstats `summariesonly` values(authentication.app) as app,count from datamodel=authentication.authentication by authentication.action,authentication.src | `drop_dm_object_name("authentication")` | eval success=if(action="success",count,0),failure=if(action="failure",count,0) | stats values(app) as app,sum(failure) as failure,sum(success) as success by src | where success > 0 | xswhere failure from failures_by_src_count_1d in authentication is above medium

MLTK: Access - Brute Force Access Behavior Detected Over 1d - Rule

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SA-EndpointProtection

XS: Change - Total Change Count By User By Change Type Per Day - Context Gen

| `tstats` count from datamodel=endpoint.filesystem where filesystem.tag="change" by _time,filesystem.user span=24h | eval change_type=if(isnull(change_type),"filesystem",change_type),user='filesystem.user' | 'tstats' append=t count from datamodel=endpoint.registry where registry.tag="change" by _time,registry.user span=24h | eval change_type=if(isnull(change_type),"registry",change_type),user='registry.user' | 'tstats' append=t count from datamodel=change.all_changes where _time,all_changes.change_type,all_changes.user span=24h | eval change_type=if(isnull(change_type),"all_changes",change_type),user='all_changes.user' | 'context_stats(change_count, change_type)' | eval min=0 | eval max=median*2 | xsupdateddcontext name=change_count_by_user_by_change_type_1d container=change_analysis type=domain app="sa-endpointprotection" scope=app terms=`xs_default_magnitude_concepts` | stats count

MLTK: Change - Total Change Count By User By Change Type Per Day - Model Gen

| `tstats` count from datamodel=Endpoint.Filesystem where FileSystem.tag="change" by _time,FileSystem.user span=24h | eval change_type=if(isnull(change_type),"filesystem",change_type),user='FileSystem.user' | 'tstats' append=T count from datamodel=Endpoint.Registry where Registry.tag="change" by _time,Registry.user span=24h | eval change_type=if(isnull(change_type),"registry",change_type),user='Registry.user' | 'tstats' append=T count from datamodel=Change.All_Changes where _time,All_Changes.change_type,All_Changes.user span=24h | eval change_type=if(isnull(change_type),"all_changes",change_type),user='all_changes.user' | fit DensityFunction change_count dist=norm into app:change_count_by_user_by_change_type_1d

XS: Endpoint - Emails By Destination Count - Context Gen

| tstats summariesonly=false dc(all_email.dest) as dest_count from datamodel=email.all_email where not all_email.src_category="email_servers" by "all_email.src",_time span=1h | stats avg(dest_count) as avg, count | eval min=0 | eval max=avg * 2 | xsupdateddcontext name=destination_count_by_src_1h container=email type=domain scope=app | stats count

MLTK: Endpoint - Emails By Destination Count - Model Gen

| tstats summariesonly=false dc(All_Email.dest) as dest_count from datamodel=Email.All_Email where NOT All_Email.src_category="email_servers" by "All_Email.src",_time span=1h | fit DensityFunction dest_count dist=norm into app:destination_count_by_src_1h

XS: Endpoint - Emails By Source - Context Gen

| tstats summariesonly=false sum(all_email.recipient_count) as recipient_count from datamodel=email.all_email where not all_email.src_category="email_servers" by "all_email.src",_time span=1h | stats avg(recipient_count) as avg, count

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eval min=0 | eval max=avg * 2 | xsupdateddcontext app=sa-endpointprotection name=recipients_by_src_1h type=domain scope=app | stats count

MLTK: Endpoint - Emails By Source - Model Gen

| tstats summariesonly=false sum(All_Email.recipient_count) as recipient_count from datamodel=Email.All_Email where NOT All_Email.src_category="email_servers" by "All_Email.src",_time span=1h | fit DensityFunction recipient_count dist=norm into app:recipients_by_src_1h

XS: Endpoint - Malware Daily Count - Context Gen

| tstats `summariesonly` dc(malware_attacks.signature) as infection_count from datamodel=malware.malware_attacks where earliest=-31d@d latest=-1d@d malware_attacks.action=allowed by malware_attacks.dest,_time span=1d | stats sum(infection_count) as total_infection_count by _time | eval min=0 | eval max=median*2 | xscreateddcontext name=count_1d container=malware type=domain terms="minimal,small,medium,large,extreme" scope=app app=sa-networkprotection | stats count

MLTK: Endpoint - Malware Daily Count - Model Gen

| tstats `summariesonly` dc(Malware_Attacks.signature) as infection_count from datamodel=Malware.Malware_Attacks where earliest=-31d@d latest=-1d@d Malware_Attacks.action=allowed by Malware_Attacks.dest,_time span=1d | stats sum(infection_count) as current_count by _time | fit DensityFunction current_count dist=norm into app:malware_infection_count_by_1d

SA-IdentityManagement

XS: Identity - Email Activity to Non-corporate Domains by Users Per 1d - Context Gen

| tstats `summariesonly` sum(all_email.size) as bytes, values(all_email.recipient) as recipient from datamodel=email.all_email where not `cim_corporate_email_domain_search("all_email.recipient")` by _time, all_email.src_user, all_email.src_user_bunit span=1h | `drop_dm_object_name("all_email")` | stats avg(bytes) as avg, stdev(bytes) as stdev, count by src_user_bunit | eval min=0 | eval max=avg + 3*stdev | xsupdateddcontext name="email_volume_1h_noncorp" class=src_user_bunit scope=app terms=`xs_default_magnitude_concepts` uom="email_volume_bytes" type=domain app=sa-identitymanagement | stats count

MLTK: Identity - Email Activity to Non-corporate Domains by Users Per 1d - Model Gen

| tstats `summariesonly` sum(All_Email.size) as bytes, values(All_Email.recipient) as recipient from datamodel=Email.All_Email where NOT `cim_corporate_email_domain_search("All_Email.recipient")` by _time, All_Email.src_user, All_Email.src_user_bunit span=1h | `drop_dm_object_name("All_Email")` | fit DensityFunction bytes by src_user_bunit dist=norm into app:email_activity_to_non_corporate_by_user_1h
### XS: Identity - Web Uploads to Non-corporate Domains by Users Per 1d - Context Gen

```
| tstats `summariesonly` sum(web.bytes) as bytes from datamodel=web.web where not(`cim_corporate_web_domain_search("web.url")`) (web.http_method="post" or web.http_method="put") by _time, web.user, web.user_bunit span=1h | `drop_dm_object_name("web")` | stats avg(bytes) as avg, stdev(bytes) as stdev, count by user_bunit | eval min=0 | eval max=avg + 3*stdev | xsupdateddcontext name="web_volume_1h_noncorp" class=user_bunit scope=app terms=`xs_default_magnitude_concepts` uom="web_volume_bytes" type=domain app=sa-identitymanagement | stats count
```

### MLTK: Identity - Web Uploads to Non-corporate Domains by Users Per 1d - Model Gen

```
| tstats `summariesonly` sum(Web.bytes) as bytes from datamodel=Web.Web where NOT(`cim_corporate_web_domain_search("Web.url")`) (Web.http_method="POST" OR Web.http_method="PUT") by _time, Web.user, Web.user_bunit span=1h | `drop_dm_object_name("Web")` | fit DensityFunction bytes by user_bunit dist=norm into app:web_upload_to_non_corporate_by_user_1h
```

### XS: Network - Event Count By Signature Per Hour - Context Gen

```
| tstats `summariesonly` count as count_by_signature_1h from datamodel=intrusion_detection.ids_attacks by _time,ids_attacks.signature span=1h | `drop_dm_object_name("ids_attacks")` | `context_stats(count_by_signature_1h, signature)` | search size>0 | xscreateddcontext name=count_by_signature_1h class=signature container=ids_attacks type=median_centered terms="minimal,low,medium,high,extreme" scope=app app=sa-networkprotection | stats count
```

### MLTK: Network - Event Count By Signature Per Hour - Model Gen

```
| tstats `summariesonly` count as ids_attacks from datamodel=Intrusion_Detection.IDS_Attacks by _time,IDS_Attacks.signature span=1h | `drop_dm_object_name("IDS_Attacks")` | fit DensityFunction ids_attacks by signature dist=norm into app:count_by_signature_1h
```

### XS: Network - Port Activity By Destination Port - Context Gen

```
| tstats `summariesonly` count as dest_port_traffic_count from datamodel=Network_Traffic.All_Traffic by All_Traffic.dest_port,_time span=1d | `drop_dm_object_name("All_Traffic")` |
```
MLTK: Network - Port Activity By Destination Port - Model Gen

| tstats `summariesonly` count as dest_port_traffic_count from datamodel=Network_Traffic.All_Traffic by All_Traffic.dest_port,_time span=1d | `drop_dm_object_name("All_Traffic")` | fit DensityFunction dest_port_traffic_count by dest_port dist=norm into app:count_by_dest_port_1d

XS: Network - Substantial Increase In Intrusion Events - Rule

| tstats `summariesonly` count,values(ids_attacks.tag) as tag from datamodel=Intrusion_Detection.ids_attacks by ids_attacks.signature | `drop_dm_object_name("ids_attacks")` | xswhere count from count_by_signature_1h in ids_attacks by signature is above medium

MLTK: Network - Substantial Increase In Intrusion Events - Rule

| tstats `summariesonly` count as ids_attacks,values(IDS_Attacks.tag) as tag from datamodel=Intrusion_Detection.IDS_Attacks by IDS_Attacks.signature | `drop_dm_object_name("IDS_Attacks")` | `mltk_apply_upper("app:count_by_signature_1h", "high", "ids_attacks")`

XS: Network - Substantial Increase in Port Activity - Rule

| tstats `summariesonly` count,values(all_traffic.tag) as tag from datamodel=network_traffic.all_traffic by all_traffic.dest_port | `drop_dm_object_name("all_traffic")` | xswhere count from count_by_dest_port_1d in network_traffic by dest_port is extreme

MLTK: Network - Substantial Increase in Port Activity - Rule

| tstats `summariesonly` count as dest_port_traffic_count,values(All_Traffic.tag) as tag from datamodel=Network_Traffic.All_Traffic by All_Traffic.dest_port | `drop_dm_object_name("All_Traffic")` | `mltk_apply_upper("app:count_by_dest_port_1d", "extreme", "dest_port_traffic_count")`

XS: Network - Traffic Source Count Per 30m - Context Gen

| tstats `summariesonly` dc(all_traffic.src) as src_count from datamodel=network_traffic.all_traffic by _time span=30m | stats count, median(src_count) as median, stdev(src_count) as size | search size>0 | xsupdateddcontext name=src_count_30m container=network_traffic terms="minimal,low,medium,high,extreme" width=3 scope=app | stats count

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MLTK: Network - Traffic Source Count Per 30m - Model Gen

| tstats `summariesonly` dc(All_Traffic.src) as src_count from datamodel=Network_Traffic.All_Traffic by _time span=30m | fit DensityFunction src_count dist=norm into app:network_traffic_src_count_30m

XS: Network - Traffic Volume Per 30m - Context Gen

| tstats `summariesonly` count as total_count from datamodel=network_traffic.all_traffic by _time span=30m | stats count, median(total_count) as median, stdev(total_count) as size | search size>0 | xsupdateddcontext name=count_30m container=network_traffic terms="minimal,low,medium,high,extreme" type=median_centered width=3 app=sa-networkprotection scope=app | stats count

MLTK: Network - Traffic Volume Per 30m - Model Gen

| tstats `summariesonly` count as total_count from datamodel=Network_Traffic.All_Traffic by _time span=30m | fit DensityFunction total_count dist=norm into app:network_traffic_count_30m

XS: Web - Web Event Count By Src By HTTP Method Per 1d - Context Gen

| tstats `summariesonly` count as web_event_count from datamodel=web.web by web.src, web.http_method, _time span=24h | `drop_dm_object_name("web")` | where match(http_method, "^[a-z]+$") | `context_stats(web_event_count, http_method)` | eval min=0 | eval max=median*2 | xscreateddcontext name=count_by_http_method_by_src_1d container=web class=http_method app="sa-networkprotection" scope=app type=domain terms=`xs_default_magnitude_concepts` | stats count

MLTK: Web - Web Event Count By Src By HTTP Method Per 1d - Model Gen


SA-ThreatIntelligence

XS: Risk - Aggregated Other Risk

| tstats `summariesonly` sum(all_risk.risk_score) as current_count from datamodel=risk.all_risk where earliest=-24h@h latest=+0s all_risk.risk_object_type="other" by all_risk.risk_object_type | appendcols [] | tstats `summariesonly` sum(all_risk.risk_score) as

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historical_count from datamodel=risk.all_risk where earliest=-48h@h latest=-24h@h all_risk.risk_object_type="other" by all_risk.risk_object_type | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("all_risk")` | `xsfindbestconcept current_count from total_risk_by_object_type_1d in risk by risk_object_type as current_count_qual | xsfindbestconcept delta from percentile in default as delta_qual

MLTK: Risk - Aggregated Other Risk

| tstats `summariesonly` sum(All_Risk.risk_score) as current_count from datamodel=Risk.All_Risk where earliest=-24h@h latest=+0s All_Risk.risk_object_type="other" by All_Risk.risk_object_type | appendcols [ | tstats `summariesonly` sum(All_Risk.risk_score) as historical_count from datamodel=Risk.All_Risk where earliest=-48h@h latest=-24h@h All_Risk.risk_object_type="other" by All_Risk.risk_object_type] | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("All_Risk")` | `mltk_findbest("app:total_risk_by_object_type_1d")` | `get_percentage_qualitative(delta, delta_qual)`

XS: Risk - Aggregated Risk

| tstats `summariesonly` sum(all_risk.risk_score) as current_count from datamodel=risk.all_risk where earliest=-24h@h latest=+0s | appendcols [ | tstats `summariesonly` sum(all_risk.risk_score) as historical_count from datamodel=risk.all_risk where earliest=-48h@h latest=-24h@h] | `get_ksi_fields(current_count, historical_count)` | `xsfindbestconcept current_count from total_risk_by_object_type_1d in risk as current_count_qual | xsfindbestconcept delta from percentile in default as delta_qual

MLTK: Risk - Aggregated Risk

| tstats `summariesonly` sum(All_Risk.risk_score) as current_count from datamodel=Risk.All_Risk where earliest=-24h@h latest=+0s | appendcols [ | tstats `summariesonly` sum(All_Risk.risk_score) as historical_count from datamodel=Risk.All_Risk where earliest=-48h@h latest=-24h@h] | `get_ksi_fields(current_count, historical_count)` | `mltk_findbest("app:total_risk_1d")` | `get_percentage_qualitative(delta, delta_qual)`

XS: Risk - Aggregated System Risk

| tstats `summariesonly` sum(all_risk.risk_score) as current_count from datamodel=risk.all_risk where earliest=-24h@h latest=+0s all_risk.risk_object_type="system" by all_risk.risk_object_type | appendcols [ | tstats `summariesonly` sum(all_risk.risk_score) as historical_count from datamodel=risk.all_risk where earliest=-48h@h latest=-24h@h all_risk.risk_object_type="system" by all_risk.risk_object_type] | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("all_risk")` |
MLTK: Risk - Aggregated System Risk

| tstats `summariesonly` sum(All_Risk.risk_score) as current_count from datamodel=Risk.All_Risk where earliest=-24h0h latest=+0s All_Risk.risk_object_type="system" by All_Risk.risk_object_type | appendcols | tstats `summariesonly` sum(All_Risk.risk_score) as historical_count from datamodel=Risk.All_Risk where earliest=-48h0h latest=-24h0h All_Risk.risk_object_type="system" by All_Risk.risk_object_type | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("All_Risk")` | `mltk_findbest("app:total_risk_by_object_type_1d")` | `get_percentage_qualitative(delta, delta_qual)`

XS: Risk - Aggregated User Risk

| tstats `summariesonly` sum(all_risk.risk_score) as current_count from datamodel=risk.all_risk where earliest=-24h0h latest=+0s all_risk.risk_object_type="user" by all_risk.risk_object_type | appendcols | tstats `summariesonly` sum(all_risk.risk_score) as historical_count from datamodel=risk.all_risk where earliest=-48h0h latest=-24h0h all_risk.risk_object_type="user" by all_risk.risk_object_type | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("all_risk")` | `mltk_findbest("app:total_risk_by_object_type_1d")` | `get_percentage_qualitative(delta, delta_qual)`

MLTK: Risk - Aggregated User Risk

| tstats `summariesonly` sum(All_Risk.risk_score) as current_count from datamodel=Risk.All_Risk where earliest=-24h0h latest=+0s All_Risk.risk_object_type="user" by All_Risk.risk_object_type | appendcols | tstats `summariesonly` sum(All_Risk.risk_score) as historical_count from datamodel=Risk.All_Risk where earliest=-48h0h latest=-24h0h All_Risk.risk_object_type="user" by All_Risk.risk_object_type | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("All_Risk")` | `mltk_findbest("app:total_risk_by_object_type_1d")` | `get_percentage_qualitative(delta, delta_qual)`

XS: Risk - Median Object Risk Per Day - Context Gen

| tstats `summariesonly` sum(all_risk.risk_score) as object_risk from datamodel=risk.all_risk by _time, all_risk.risk_object, all_risk.risk_object_type span=1d | `drop_dm_object_name("all_risk")` | `context_stats(object_risk, risk_object_type)` | eval min=0 | eval max=median*2 | `xsupdateddcontext app=sa-threatintelligence name=median_object_risk_by_object_type_1d` |
### MLTK: Risk - Median Object Risk Per Day - Model Gen

| tstats `summariesonly` sum(All_Risk.risk_score) as current_count from datamodel=Risk.All_Risk by _time,All_Risk.risk_object,All_Risk.risk_object_type span=1d | 'drop_dm_object_name("All_Risk")' | fit DensityFunction current_count by risk_object_type dist=norm into app:median_object_risk_by_object_type_1d |

### XS: Risk - Median Object Risk Per Day by Object Type - Context Gen


### MLTK: Risk - Median Object Risk Per Day by Object Type - Model Gen

| tstats `summariesonly` sum(All_Risk.risk_score) as current_count from datamodel=Risk.All_Risk by _time,All_Risk.risk_object,All_Risk.risk_object_type span=1d | 'drop_dm_object_name("All_Risk")' | fit DensityFunction current_count by risk_object_type dist=norm into app:median_object_risk_by_object_type_1d |

### XS: Risk - Median Risk Score

| tstats `summariesonly` sum(all_risk.risk_score) as accum_risk from datamodel=risk.all_risk where earliest=-24h@h latest=+0s by all_risk.risk_object | stats median(accum_risk) as current_count | appendcols [] | tstats `summariesonly` sum(all_risk.risk_score) as accum_risk from datamodel=risk.all_risk where earliest=-48h@h latest=-24h@h by all_risk.risk_object | stats median(accum_risk) as historical_count | `get_ksi_fields(current_count, historical_count)` | xsfindbestconcept current_count from median_object_risk_by_object_type_1d in risk as current_count_qual | xsfindbestconcept delta from percentile in default as delta_qual |

### MLTK: Risk - Median Risk Score

| tstats `summariesonly` sum(All_Risk.risk_score) as accum_risk from datamodel=Risk.All_Risk where earliest=-24h@h latest=+0s by All_Risk.risk_object | stats median(accum_risk) as current_count | appendcols [] | tstats `summariesonly` sum(All_Risk.risk_score) as accum_risk from datamodel=Risk.All_Risk where earliest=-48h@h latest=-24h@h by All_Risk.risk_object | stats median(accum_risk) as historical_count | `get_ksi_fields(current_count, historical_count)` | `mltk_findbest("app:median_object_risk_1d")` | `get_percentage_qualitative(delta, delta_qual)` |
XS: Risk - Median Risk Score By Other

| tstats `summariesonly` sum(all_risk.risk_score) as accum_risk from datamodel=risk.all_risk where earliest=-24h@h latest=+0s all_risk.risk_object_type="other" by all_risk.risk_object, all_risk.risk_object_type | stats median(accum_risk) as current_count | appendcols []| tstats `summariesonly` sum(all_risk.risk_score) as accum_risk from datamodel=risk.all_risk where earliest=-48h@h latest=-24h@h all_risk.risk_object_type="other" by all_risk.risk_object, all_risk.risk_object_type | stats median(accum_risk) as historical_count | eval risk_object_type="other" | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("all_risk")` | xsfindbestconcept current_count from median_object_risk_by_object_type_1d in risk by risk_object_type as current_count_qual | xsfindbestconcept delta from percentile in default as delta_qual

MLTK: Risk - Median Risk Score By Other

| tstats `summariesonly` sum(All_Risk.risk_score) as accum_risk from datamodel=Risk.All_Risk where earliest=-24h@h latest=+0s All_Risk.risk_object_type="other" by All_Risk.risk_object, All_Risk.risk_object_type | stats median(accum_risk) as current_count | appendcols []| tstats `summariesonly` sum(All_Risk.risk_score) as accum_risk from datamodel=Risk.All_Risk where earliest=-48h@h latest=-24h@h All_Risk.risk_object_type="other" by All_Risk.risk_object, All_Risk.risk_object_type | stats median(accum_risk) as historical_count | eval risk_object_type="other" | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("All_Risk")` | `mltk_findbest("app:median_object_risk_by_object_type_1d")` | `get_percentage_qualitative(delta, delta_qual)`

XS: Risk - Median Risk Score By System

| tstats `summariesonly` sum(all_risk.risk_score) as accum_risk from datamodel=risk.all_risk where earliest=-24h@h latest=+0s all_risk.risk_object_type="system" by all_risk.risk_object, all_risk.risk_object_type | stats median(accum_risk) as current_count | appendcols []| tstats `summariesonly` sum(all_risk.risk_score) as accum_risk from datamodel=risk.all_risk where earliest=-48h@h latest=-24h@h all_risk.risk_object_type="system" by all_risk.risk_object, all_risk.risk_object_type | stats median(accum_risk) as historical_count | eval risk_object_type="system" | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("all_risk")` | xsfindbestconcept current_count from median_object_risk_by_object_type_1d in risk by risk_object_type as current_count_qual | xsfindbestconcept delta from percentile in default as delta_qual

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MLTK: Risk - Median Risk Score By System

```bash
| tstats `summariesonly` sum(All_Risk.risk_score) as accum_risk from datamodel=Risk.All_Risk where earliest=-24h@h latest=+0s All_Risk.risk_object_type="system" by All_Risk.risk_object, All_Risk.risk_object_type | stats median(accum_risk) as current_count | appendcols [| tstats `summariesonly` sum(All_Risk.risk_score) as accum_risk from datamodel=Risk.All_Risk where earliest=-48h@h latest=-24h@h All_Risk.risk_object_type="system" by All_Risk.risk_object, All_Risk.risk_object_type | stats median(accum_risk) as historical_count] | eval risk_object_type="system" | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("All_Risk")` | `mltk_findbest("app:median_object_risk_by_object_type_1d")` | `get_percentage_qualitative(delta, delta_qual)`
```

XS: Risk - Median Risk Score By User

```bash
| tstats `summariesonly` sum(all_risk.risk_score) as accum_risk from datamodel=risk.all_risk where earliest=-24h@h latest=+0s all_risk.risk_object_type="user" by all_risk.risk_object, all_risk.risk_object_type | stats median(accum_risk) as current_count | appendcols [| tstats `summariesonly` sum(all_risk.risk_score) as accum_risk from datamodel=risk.all_risk where earliest=-48h@h latest=-24h@h all_risk.risk_object_type="user" by all_risk.risk_object, all_risk.risk_object_type | stats median(accum_risk) as historical_count] | eval risk_object_type="user" | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("all_risk")` | `xsfindbestconcept current_count from median_object_risk_by_object_type_1d in risk by risk_object_type as current_count_qual | xsfindbestconcept delta from percentile in default as delta_qual
```

MLTK: Risk - Median Risk Score By User

```bash
| tstats `summariesonly` sum(All_Risk.risk_score) as accum_risk from datamodel=Risk.All_Risk where earliest=-24h@h latest=+0s All_Risk.risk_object_type="user" by All_Risk.risk_object, All_Risk.risk_object_type | stats median(accum_risk) as current_count | appendcols [| tstats `summariesonly` sum(All_Risk.risk_score) as accum_risk from datamodel=Risk.All_Risk where earliest=-48h@h latest=-24h@h All_Risk.risk_object_type="user" by All_Risk.risk_object, All_Risk.risk_object_type | stats median(accum_risk) as historical_count] | eval risk_object_type="user" | `get_ksi_fields(current_count, historical_count)` | `drop_dm_object_name("All_Risk")` | `mltk_findbest("app:median_object_risk_by_object_type_1d")` | `get_percentage_qualitative(delta, delta_qual)`
```

XS: Risk - Total Risk By Risk Object Type Per Day - Context Gen

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Audit searches using an MLTK Model

There is a savedsearch to help audit your model generating searches and the corresponding rules that apply them.

For example, the following savedsearch finds the search called "Network - Traffic Source Count Per 30m - Model Gen" that builds the model for network_traffic_src_count_30m with fit densityfunction. Then it also finds the rule called "Network - Unusual Volume of Network Activity - Rule" that applies data to the model and finds the outliers using apply and the `get_qualitative_upper_threshold(extreme)` macro.

Example search:
Example results:

<table>
<thead>
<tr>
<th>eai:acl.app</th>
<th>title</th>
<th>search</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA-NetworkProtection</td>
<td>Network - Traffic Source Count Per 30m - Model Gen</td>
<td>tstats <code>summariesonly</code> `dc(all_traffic.src) as src_count from datamodel=network_traffic.all_traffic by _time span=30m</td>
</tr>
<tr>
<td>DA-ESS-NetworkProtection</td>
<td>Network - Unusual Volume of Network Activity - Rule</td>
<td>tstats <code>summariesonly</code> `dc(all_traffic.src) as src_count,count as total_count from datamodel=network_traffic.all_traffic</td>
</tr>
</tbody>
</table>

Machine Learning Toolkit Macros in Splunk Enterprise Security

Machine Learning Toolkit macros act as shortcuts and wrappers. The macros are found from the Splunk Enterprise menu at Settings > Advanced Search > Search macros.

An example of using a macro to apply data to model=app:failures_by_src_count_1d for qualitative_id=medium, and field=failure:

```plaintext
... | `mltk_apply_upper("app:failures_by_src_count_1d", "medium", "failure")`
```

Versus doing it without the macro:

```plaintext
... | apply app:failures_by_src_count_1d || inputlookup append=T qualitative_thresholds_lookup where qualitative_id="medium" | rename threshold as upper_threshold | return upper_threshold | eval search=replace(search,"\\","") | search "IsOutlier(failure)"=1
```
Macros used in SPL

You might use the following macros to apply data to your models.

**[mltk_apply]**

This is approximately equivalent to the xsWhere command, for applying to either upper or lower bounds.

```
[mltk_apply(3)]
args       = model,qualitative_id,field
definition = apply $model$ [|
  `get_qualitative_threshold($qualitative_id$)`
| search
  "IsOutlier($field$)"=1
```

The macro takes the following arguments:

- **model**
  The name of the model for applying data and comparing against standards to find outliers, such as `app:failures_by_src_count_1d`.

- **qualitative_id**
  The default IDs that correspond to percentages of deviation, representing where on the distribution curve to start looking for the outliers, such as `medium`.

- **field**
  The name of the field that you're searching or counting to find outliers, such as `failure`.

**[mltk_apply_lower]**

This is approximately equivalent to the xsWhere command, for applying to lower bounds.

```
[mltk_apply_lower(3)]
args       = model,qualitative_id,field
definition = apply $model$ [|
  `get_qualitative_lower_threshold($qualitative_id$)`
| search
  "IsOutlier($field$)"=1
```

The macro takes the following arguments:

- **model**
  The name of the model for applying data and comparing against standards to find outliers, such as `app:failures_by_src_count_1d`.
qualitative_id
The default IDs that correspond to percentages of deviation, representing where on the distribution curve to start looking for the outliers, such as medium.

field
The name of the field that you’re searching or counting to find outliers, such as failure.

[mltk_apply_upper]
This is approximately equivalent to the xsWhere command, for applying to upper bounds.

[mltk_apply_upper(3)]
args       = model,qualitative_id,field
definition = apply $model$ [|
`get_qualitative_upper_threshold($qualitative_id$)`] | search
"IsOutlier($field$)"=1

The macro takes the following arguments:

model
The name of the model for applying data and comparing against standards to find outliers, such as app:failures_by_src_count_1d.

qualitative_id
The default IDs that correspond to percentages of deviation, representing where on the distribution curve to start looking for the outliers, such as medium.

field
The name of the field that you’re searching or counting to find outliers, such as failure.

[mltk_findbest]
This is approximately equivalent to the xsFindBestConcept command. For each value, this macro tells you in which threshold range the value falls on the distribution curve.

[mltk_findbest(1)]
args       = model
definition = apply $model$ as findbest [|
`get_findbest_thresholds`]| eval [|
`get_findbest_qualitative`]| fields - BoundaryRanges,findbest*

The macro takes the following arguments:
The name of the model for applying data and comparing against standards to find outliers, such as `app:failures_by_src_count_1d`.

Note that the threshold doesn't take a field parameter like the other macros. It performs the `findbest` operation on the exact field that the Model Gen `fit` command was performed on. For example:

- If the Model Gen performed: `... | fit DensityFunction current_count dist=norm into app:total_risk_1d`, the `mltk_findbest()` search will only match on the `current_count` field.
- This means that the portion of the search that comes before the `mltk_findbest()` command must contain the `current_count` field.

### Macros used by other macros

These macros are in use by the macros used in SPL.

**[get_qualitative_threshold]**

This is a building block for `[mltk_apply]`. You might not use this one by itself.

```framing
[get_qualitative_threshold(1)]
args = qualitative_id
definition = inputlookup append=T qualitative_thresholds_lookup where qualitative_id="""$qualitative_id"""" | return threshold | eval search=replace(search,\"\","")
```

The macro takes the following arguments:

- **qualitative_id**
  - The default IDs that correspond to percentages of deviation, representing where on the distribution curve to start looking for the outliers, such as `medium`.

**[get_qualitative_lower_threshold]**

This is a building block for `[mltk_apply_upper]`. You might not use this one by itself.

```framing
[get_qualitative_lower_threshold(1)]
args = qualitative_id
definition = inputlookup append=T qualitative_thresholds_lookup where qualitative_id="""$qualitative_id"""" | rename threshold as lower_threshold
```

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The macro takes the following arguments:

**qualitative_id**

The default IDs that correspond to percentages of deviation, representing where on the distribution curve to start looking for the outliers, such as medium.

**[get_qualitative_upper_threshold]**

This is a building block for [mltk_apply_upper]. You might not use this one by itself.

```
|get_qualitative_upper_threshold(1)| args = qualitative_id
definition = inputlookup append=T qualitative_thresholds_lookup where qualitative_id="$qualitative_id$" | rename threshold as upper_threshold | return upper_threshold | eval search=replace(search,"\\\","")
```

The macro takes the following arguments:

**qualitative_id**

The default IDs that correspond to percentages of deviation, representing where on the distribution curve to start looking for the outliers, such as medium.

**[get_findbest_thresholds]**

This is a building block for [mltk_findbest]. You might not use this one by itself.

```
|get_findbest_thresholds|
definition = inputlookup append=T qualitative_thresholds_lookup | stats values(threshold) as search | eval search="threshold="mvjoin(mvsort(search), ",","")"
```

**[get_findbest_qualitative]**

This is a building block for [mltk_findbest]. You might not use this one by itself.

```
|get_findbest_qualitative|
definition = inputlookup append=T qualitative_thresholds_lookup | eval threshold_id="findbest_th=".threshold | sort threshold | eval subcase="".threshold_id."="\"1.0\",".qualitative_label."\" | stats values(subcase) as search | eval search="qualitative=case(".mvjoin(search, ",",")"
```
Convert Extreme Searches to Machine Learning Toolkit in Splunk Enterprise Security

If you need to convert any locally modified XS searches to MLTK, use the following information to help guide your decisions.

Converting XS commands

The most common common XS commands that have MLTK equivalents in ES follow.

**xsWhere**

The `xsWhere` command is approximately equivalent to the `mltk_apply` macro. These apply data to a model, compare against thresholds, and find outliers for a field. For each value, given the provided threshold, the macros tell you if the value is an outlier. See Abnormally High Number of HTTP Method Events By Src - Rule in DA-ESS-NetworkProtection.

**xsFindBestConcept**

The `xsFindBestConcept` command is approximately equivalent to the `mltk_findbest` macro. They are almost the opposite of the `xsWhere` and `apply` commands. For each value, these tell you in which threshold range the value falls on the distribution curve. For example: the high range is between 0.05 - 0.01, and the extreme range is between 0.01 - 0.000000001. See Access - Total Access Attempts in DA-ESS-AccessProtection.

**xsCreateDDContext**

The `xsCreateDDContext` command is approximately equivalent to the `fit` command. These both generate a new model each time the search is run. See Access - Authentication Failures By Source in SA-AccessProtection.

**xsUpdateDDContext**

Each time this is run, it will combine the new training with the existing model. There is no `xsUpdateDDContext` equivalent in MLTK at this time. There are no models/contexts that are updated additively. All model-generation searches wipe out the old model and produce a new model based on the data retrieved in the dispatch window.
To accommodate this change, the dispatch times of the Model Gen searches that were converted from `xsUpdateDDContext` XS searches have been increased to generate the model from more data, to get more reliable models.

**Converting a Context Gen Search**

As an example of converting a context gen search, consider Access - Authentication Failures By Source - Context Gen as three lines.

<table>
<thead>
<tr>
<th>Line</th>
<th>SPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>`</td>
</tr>
<tr>
<td>2.</td>
<td>`</td>
</tr>
<tr>
<td>3.</td>
<td>`</td>
</tr>
</tbody>
</table>

**Line one**

Line one starts by counting the authentication failures per hour:

```spl
| tstats `summariesonly` count as failures from datamodel=Authentication.Authentication where Authentication.action="failure" by Authentication.src,_time span=1h
```

**Line two**

Line two contains `stats median(failures) as median, min(failures) as min, count as count | eval max = median*2`, which is putting the results of the search into the input format that the XS `xsUpdateDDContext` command requires. In some searches you see the macro `context_stats` used instead, such as `context_stats(web_event_count, http_method)`.

**Line three**

Line three uses the XS `xsUpdateDDContext` command to build a data-defined historical view context, puts it in an app context, gives it a name, assigns a container, and a scope.

Consider the MLTK version of the search is Access - Authentication Failures By Source - Model Gen as two lines.

<table>
<thead>
<tr>
<th>Line</th>
<th>SPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>`</td>
</tr>
</tbody>
</table>
The steps for converting this search from a context gen search to a model gen search follow:

1. Line one starts the same way for both searches, by counting the authentication failures per hour. Keep this when converting to MLTK.
2. The fit command takes tables as inputs, thus it is not necessary to include | stats median(failures) as median, min(failures) as min, count as count | eval max = median*2
3. In line two for the MLTK version of the search, do the following:
   1. Replace the XS command `xsUpdateDDContext` with the approximate equivalent of `fit DensityFunction`.
   2. Include the `failure` field that you're counting in the first part of the search.
   3. Add the `dist=norm` to represent the normal distribution bell curve of the density function.
   4. Use `into` for passing the data into the model.
   5. Keep the name from the original search because it is also the model name for MLTK.
      1. All MLTK model names should include the `app:` prefix, which properly saves the model into the shared application namespace.
      2. In this example, append it to the name "failures_by_src_count_1h" so that it resembles `app:failures_by_src_count_1h`.

Converting a Correlation Search

As an example of converting a correlation search, consider Access - Brute Force Access Behavior Detected - Rule as four lines.
Line one
Line one starts by searching the authentication data model:

| from datamodel:"Authentication"."Authentication"

Line two
Line two contains:

| stats values(tag) as tag,values(app) as app,count(eval('action'=='"failure")) as failure,count(eval('action'=='"success")) as success by src, which is counting authentication failures followed by success.

Line three
Line three searches for successes greater than 0.

Line four
Line four uses the XS `xswhere` command to match a concept within a specified context and determine compatibility, in this case authentication is above medium.

Consider the MLTK version of the search Access - Brute Force Access Behavior Detected - Rule as four lines.

<table>
<thead>
<tr>
<th>Line</th>
<th>SPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td><code>mltk_apply_upper(&quot;app:failures_by_src_count_1h&quot;, &quot;medium&quot;, &quot;failure&quot;)</code></td>
</tr>
</tbody>
</table>

The steps for converting this search to MLTK:

1. Keep line 1 as-is.
2. Keep line 2 as-is.
3. Keep line 3 as-is.
4. In line four, do the following:
1. Replace the XS command `xswhere` with the approximate equivalent of the `mltk_apply_upper` macro.
   1. The macro wraps the MLTK `apply` function and filters the results based on whether the values are above or below a certain threshold.
2. Include the argument for the model name `app:failures_by_src_count_1h` from the model gen search that builds the model.
3. Include the argument for the qualitative_id of `medium`.
4. Include the argument for the `failure` field that you're counting in the first part of the search.

---

### Converting a Key Indicator Search

To convert a Key Indicator search to use MLTK, you have to first convert the corresponding Model Gen search. The Key Indicator search references the ML model name created by the Model Gen search.

As an example of converting a correlation search, consider Risk - Median Risk Score as seven lines.

<table>
<thead>
<tr>
<th>Line</th>
<th>SPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>`</td>
</tr>
<tr>
<td>2.</td>
<td>`</td>
</tr>
<tr>
<td>3.</td>
<td>`</td>
</tr>
<tr>
<td>4.</td>
<td>`</td>
</tr>
<tr>
<td>5.</td>
<td>`</td>
</tr>
</tbody>
</table>

**Line one**

Line one starts by searching for data from the current day.
**Line two**
Line two starts by searching data from the previous day.

**Line three**
Line three calculates the delta as a percentage between current_count and historical_count (today's value and yesterday's value). So if yesterday's value was 100 and today's is 125, then the delta = 25% and the direction = increasing.

**Line four**
Line four evaluates the statistics counts.

**Line five**
Line five finds the delta percentage for the key indicator in the risk analysis dashboard.

Converting Risk - Median Risk Score to MLTK.

<table>
<thead>
<tr>
<th>Line</th>
<th>SPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>[ tstats <code>summariesonly</code> sum(All_Risk.risk_score) as accum_risk from datamodel=Risk.All_Risk where earliest=-24h@h latest=+0s by All_Risk.risk_object</td>
</tr>
<tr>
<td>2.</td>
<td>[ tstats <code>summariesonly</code> sum(All_Risk.risk_score) as accum_risk from datamodel=Risk.All_Risk where earliest=-48h@h latest=-24h@h by All_Risk.risk_object</td>
</tr>
<tr>
<td>3.</td>
<td><code>get_ksi_fields(current_count, historical_count)</code></td>
</tr>
<tr>
<td>4.</td>
<td><code>mltk_findbest(&quot;app:median_object_risk_by_object_type_1d&quot;)</code></td>
</tr>
<tr>
<td>5.</td>
<td><code>get_percentage_qualitative(delta, delta_qual)</code></td>
</tr>
</tbody>
</table>

Lines one through three remain as-is. The last two lines are replaced with the MLTK equivalent:

1. In line four, replace the `xsfindbestconcept current_count` with the approximate equivalent of `mltk_findbest` macro. This is a macro that wraps the MLTK `apply` function. For each value, this macro tells you in which threshold range the value falls on the distribution curve. Notice that this model doesn't need a field name for a specific field that you're applying it on. This is because the field is determined during the `fit`, so you only need to make sure that the field exists in the results when doing the `apply`. 

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2. In line five, replace the `xsfindbestconcept delta` with the approximate equivalent of the `get_percentage_qualitative` macro. This applies a qualitative term to the delta between the current count and the historical count, such as extremely, moderately, greatly. You will see these as indicators in the risk analysis dashboard.

You cannot rename `current_count`, as this is expected.

**Machine Learning Toolkit Troubleshooting in Splunk Enterprise Security**

Troubleshoot MLTK in Splunk Enterprise Security. There are some known issues and potential workarounds.

**Error messages**

MLTK errors are found in the `mlspl.log` file. The errors themselves are not necessarily enough to trouble shoot the issues. The Machine Learning Audit dashboard helps to correlate MLTK errors with the corresponding failed searches. See Machine Learning Audit Dashboard.

**Testing and training models overwrites them**

Since MLTK replaces the models with every run, you can test in your user space without overwriting the original model. MLTK model names with the app: prefix are saved into the shared application namespace, for example:

`.apps/SA-AccessProtection/lookups/failures_by_src_count_1d.csv`. If you are the admin user and you revise the search to remove the app: prefix, then it will save in the admin user space, such as

`.users/admin/SplunkEnterpriseSecuritySuite/lookups/recipients_by_src_1h.csv`, and it will not overwrite the original. The user and app name spaces depend on the user that is logged in and the app currently running. You can also revise the name of the model to avoid overwriting the original while testing.

**Original model name:**

```
| tstats `summariesonly` count as failure from
datamodel=Authentication.Authenticatiopol where
Authentication.action="failure" by Authentication.src,_time span=1h |
fit DensityFunction failure dist=norm into app:failures_by_src_count_1h
```
Model name revised to save in non-app space:
| tstats `summariesonly` count as failure from datamodel=Authentication.Authentication where Authentication.action="failure" by Authentication.src,_time span=1h | fit DensityFunction failure dist=norm into failures_by_src_count_1h

Model name revised to include testing:
| tstats `summariesonly` count as failure from datamodel=Authentication.Authentication where Authentication.action="failure" by Authentication.src,_time span=1h | fit DensityFunction failure dist=norm into app:testing_failures_by_src_count_1h

Maximum group limit

There is a limit of 1024 on the maximum number of groups that can be created when using the MLTK DensityFunction with a by clause. If you have custom searches that you're converting to MLTK, depending what you use to split your searches, the results will not display if the number of groups is too large to split with the by clause. To change the limit, change the value of the max_groups field in the DensityFunction stanza of the mlspl.conf file in the Machine Learning Toolkit app.

Example search

| tstats `summariesonly` count as dest_port_traffic_count from datamodel=Network_Traffic.All_Traffic by All_Traffic.dest_port,_time span=1d | `drop_dm_object_name("All_Traffic")` | fit DensityFunction dest_port_traffic_count by dest_port dist=norm into app:count_by_dest_port_1d

Example error message
Error in 'fit' command: Error while fitting "DensityFunction model: The number of groups cannot exceed <abc>; the current number of groups is <xyz>.


CSV required

There's a lookup table file at $SPLUNK_HOME/etc/apps/SA-Utils/lookups/qualitative_thresholds.csv that's required for using the qualitative_id thresholds. If the CSV file is missing, then you can't use the qualitative_id thresholds for extreme, high, medium, low, and minimal.
MLTK-backed key performance indicator errors

The Risk Analysis page shows risk scores that are "unable to load results" for up to one day after a risk modifier has been created.
Risk Analysis

DISTINCT MODIFIER SOURCES
Source Count
17  +17

DISTINCT RISK OBJECTS
Object Count
833  +833

Risk Score By Object

<table>
<thead>
<tr>
<th>risk_object</th>
<th>risk_object_type</th>
<th>risk_score</th>
</tr>
</thead>
<tbody>
<tr>
<td>172.0.0.9</td>
<td>system</td>
<td>5280</td>
</tr>
<tr>
<td>172.0.0.1</td>
<td>system</td>
<td>5200</td>
</tr>
</tbody>
</table>
This occurs because the key security indicator searches have been updated to MLTK, and the corresponding MLTK models of these qualitative key indicators haven't been generated yet.

To load these results, manually run the following searches from Configure > Content > Content Management:

- Risk - Median Object Risk Per Day - Model Gen
- Risk - Total Risk By Risk Object Type Per Day - Model Gen

**Python3 and MLTK 5.x**

When the Python2 to Python3 cut-off happens, such as in MLTK 5.x, the previously generated models from MLTK 4.x will not be compatible and will have to be regenerated. This may not be an issue since the model-gen searches run on a daily basis anyway. However, you will have to re-run models immediately after upgrading to MLTK 5.x if you want to use MLTK searches.

See Update Splunk MLTK models for Python 3 in the Splunk Enterprise Python 3 Migration guide.